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ORTHODONTIC EDUCATION*

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I APPRECIATE the perplexities of my subject and recall a paragraph from Betts,[1] which I heeded twenty years ago and which reads as follows: "Possibly it is this very difficulty in the way of accurate measurement of educational results that makes so many inexpert critics ready to express their educational convictions. For there is nothing that the average man loves more to do than to publish and defend his own particular educational creed. It therefore comes about that many who would not dare to show their lack of information and grasp in the field of science or mathematics by writing articles or appearing in public lectures in these fields, rush into print or readily proclaim their educational doctrines with at least as little technical knowledge of the educational factors as they have of the science of mathematics. This probably explains why much of the matter printed on educational theory is without value, and no small part of it actually misleading."

Education has all too frequently been thought of as a mere preparation for immediate tasks ahead instead of a "constant function, independent of age." The progress of science of the last three centuries has changed all our views of life, so that our "educational aim must constantly be redefined." Troublesome as the use of scientific method may be, it is the only way by which we can rid ourselves of the useless. Whether we realize it or not, we are engaged in a "continuous reconstruction of experience." The information and the familiarity with dental problems acquired by the pioneers were not so extensive as ours, and their conclusions and modes of procedure are seldom adequate in our day.

To achieve the highest objectives of education so that we may make the conditions of our life progressively better, requires intelligent correction of its

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procedures, corrections based on the results of careful inquiry. As students of science, we must learn to break away, if need be, from obsolete standards and methods of education if these impose limitations. Improvements in our educational methods can come only if we apply intelligent scrutiny to them, for there is nothing inherent in educational projects to assure their ultimate perfection.

Progress, as commonly defined, denotes a forward movement or advance; by many it is accepted as an intrinsic condition of life, prescribed by high authority. Nevertheless, progress does not occur unless man inaugurates a patient and experimental study of his problems. Despite all our proficiency, mankind does not escape accidents, diseases, and many other complications which require scientific understanding and training for their prevention and control. This has encouraged the development of numerous professions. Dentistry is one of these professions, brought into being in response to human needs. During the last few decades dentistry has, in fact, become a remedial art of the very greatest value to mankind. Its practitioners must now acquire an extended educational background as well as special scientific and technical training.

Universities are acknowledged as some of the oldest and most useful institutions established by man. "They represent the embodiment in each nation of its highet ideals of scholarship." For centuries they confined their instruction to courses in philosophy, law, theology, and medicine. In recent decades, especially since the founding of state universities in America, they have gradually responded to public demands and materially enlarged their programs, so that numerous additional courses are now offered in most universities. Because of this departure from ancient limitations they have been subjected to severe criticisms. Nearly all the courses and subjects which have been added "had to fight for their place in the sun. Each was opposed as either trivial, or irrelevant, or menacing to the nonutilitarian ideals of pure learning."

Without enumerating the many subjects which now are included in university curricula, it is sufficient for our purpose to note that, besides medicine, courses for the study of public health, dentistry, nursing, pharmacy, and education in all its branches, are offered in a considerable number of universities. And very few dental colleges remain which are not integral schools of universities. It is also generally recognized that universities are the most effective institutions for providing a superior apprenticeship for those newer professions alluded to above. At all events, dentistry is a field of knowledge that "permits of serious scientific analysis and exposition," serves a fundamental human need and is inseparably connected with one of the most important concepts of modern life, namely, health.

Orthodontics, as you know, is one of the newer branches of dentistry and, as we shall see, one whose educational requisites have not been subjected to exacting scientific scrutiny and rational control. It originated in a hit-or-miss fashion and continues to be hindered in its development by remnants of previous periods through which dental education has passed. Most of our orthodontic educational methods we simply justify by rationalizing, as though they constituted the best attainable system. In my humble opinion the old order of empirical methods of dental education was not divinely ordained, and sufficient

data are now available to prove that without extensive alteration we can never solve the so-called orthodontic problem. I confidently believe, however, that orthodontic education can be analyzed in a rational way, and the following suggestions are offered in the hope that our unfair and extremely negligent methods may give way to a planned system which is based on the urgent needs of millions of children.

Dental education, like all education, is not an exact science, but a difficult and complicated undertaking. Comprehensive understanding of appropriate curricula for students of dentistry has been enlarged by the development of those sciences which have shed so much light on our perplexities during the last fifty years. We must not forget that when Harris and his colleagues first sought the counsel of educational authorities, bacteriology and biochemistry were unknown as sciences.

The repairing of carious teeth, the extraction of diseased teeth, and their subsequent replacement with artificial substitutes embraced the duties of the dentist for many decades. Dental surgery and prosthetics were consequently developed very early, prosecuted with great care and skill, and esteemed very highly. The subsequent division of dentistry into several specialties has materially contributed to its technical proficiency, and the excellence of the standards set up for numerous dental operations has won general approval. Perfecting these modes of procedure and providing adequate training in them for undergraduates have demanded most of our abilities and available resources.

To be sure, technical training is of basic importance to dentists; and, in all probability, they will always have to acquire a very generous measure of expertness for many difficult, unavoidable operations. But while this technical proficiency is a qualification we dare not ignore, it is only a means and not the end of dental education. The human origin of dental problems affords sound reasons why dentists should be liberally educated. The arbitrary disregard of the educational value of these problems is extraordinary. The economic and psychologic factors, and the biologic and medical implications of numerous dental difficulties awaiting solution are indisputable, and many of them will not be solved unless dentistry presses forward in its scientific and educational outlook.

A comprehensive view of future possibilities for dentistry persuades us to judge dental schools by standards other than that of technical training. The conviction has grown rapidly in the last score of years that freedom to advance the cause of higher dental education is increasingly dependent on the adequateness of funds. If college income is restricted to tuition fees and clinic receipts, the temptation remains to boost student enrollment and to adopt clinical procedures which are profitable. Scientific direction is very likely to be ignored, and the operation of a school may thus become a profitable, or at least self-supporting business. Practices which are sound in a business enterprise, but unsound for a profession, usually become guiding principles. Above all, a dental college should no longer be rated as a professional school if it trains students largely to increase its clinic income, if it overemphasizes the technical training demanded by state board examinations, or if it merely trains its students to make

a living in the practice of dentistry. Dental education is more than this training for skill, success, and the making of a living. It should be a preparation for a useful professional career in which an indispensable culture, which universities are capable of imparting, is essential.

Orthodontics came into being as a branch of mechanical dentistry, before the latter was renamed prosthetic dentistry. Dr. C. L. Goddard, a former dean and professor of mechanical dentistry in the University of California College of Dentistry, used to teach it as an extension of his subject. He contributed chapters on Orthodontic Technic to Essig's *American Textbook of Prosthetic Dentistry,* which were very valuable at the time (1896) and which revealed the contemporaneous comprehension of the subject. During this period laboratory courses in appliance construction were inaugurated, and clinical patients seeking correction for their dental anomalies were indiscriminately assigned to all undergraduate students who had qualified for clinical practice. Few orthodontists came from such a source, and the treatment which their patients received need not be discussed.

At the beginning of the century, Doctors C. S. Case and E. H. Angle had established themselves as orthodontists by restricting their practices to the correction of malocclusion of the teeth, except that Case included the construction of artificial vela for clefts of the palate and for many years Angle accepted fractures of the jaws for treatment. Their success as specialists and their numerous contributions to our knowledge of dental anomalies hastened the acceptance of orthodontics as a definite division of dental practice.

Instruction for undergraduate students was gradually taken over by teachers who had announced themselves as specialists, or who were planning to do so. The subject was thus separated from prosthetics and permitted to expand. Lecture courses, consisting of one lecture per week for a brief semester, were inaugurated. Some of these courses were given at night by busy specialists, and clinical instruction was entirely discontinued in some colleges, because the difficulties which these pioneers encountered in practice forced some of them to the conviction that dental students could never hope to master orthodontic therapy within the allotted time. In a few instances the young teacher approached his responsibilities more cautiously; by severely restricting the number of clinical patients under treatment, and by stopping their random assignment to undergraduate students, clinical instruction in orthodontic therapy could continue and his own training could thus be procured.

Short private courses were then offered, the era of the specialist was at hand, and, after organization of the American Society of Orthodontists (1901), the practice of orthodontics became a vigorous specialty. Leaders who were instrumental in promoting this new departure in dental practice were also active in recommending a more restricted amount of instruction for undergraduate students. A few were, in fact, urging complete separation of orthodontics from the parent profession of dentistry; and one announcement of such a private course of training, extending over four weeks, even invited physicians, without any dental education, to enroll. The three-year dental curriculum of this period was already filled with important subjects, and the development of

other divisions of dentistry was so rapid that the pleading for a minimum of orthodontic training for dentists was widely accepted. By unloading their responsibilities to a convenient destiny, dental schools thus left the development of orthodontic education in the hands of aggressive specialists who owned private schools. And this, be it remembered, at a time when university guidance was still in its infancy and ineffective.

Orthodontic instruction has thus been perceived as a postgraduate proposition, and undergraduate dental curricula have been based upon this concept. In other words, undergraduate instruction in this vital subject has never been developed like the instruction in dental surgery and prosthetics, hence much of our postgraduate work is really of undergraduate grade. Our first postgraduate experiments were also very short intensive courses, varying from four to eight weeks in length, in which the practical phases, i.e., the technical details of mechanotherapy, were always emphasized. Many laboratory courses were often overloaded with inappropriate details and were generally based on vocational concepts, that is to say, craftsmanship and immediate results were the aim.

Succeeding this period, the four-year dental course was adopted by many schools. Dental education was advancing so rapidly that, after another very brief time, still higher standards were extensively discussed, and full university status for all dental colleges was vigorously recommended and widely adopted. Nevertheless, disagreement still remains, and several plans of dental education are in operation at present.

Notwithstanding these extensions of the dental course, orthodontic instruction for undergraduates has not been essentially altered or enlarged. Some schools have endeavored to solve the orthodontic education problem by offering graduate work in the subject, and in a few instances the graduate divisions of university faculties have generously cooperated, so that students may qualify as candidates for the degree of Master of Science. Although the number of applicants for additional instruction has increased during the last twenty years, relatively few attain graduate standing. Some of these students are ineligible to graduate status because their previous training is inadequate; others are unwilling to devote the required time and study to fulfilling the minimum graduate prerequisites. While this condition will, doubtless, improve, because many of the undergraduate courses which previously were unacceptable for admission to graduate work are no longer operative, special graduate courses for practitioner training continue to predominate. These special courses which do not lead to a higher degree are generally less comprehensive than graduate courses.

This brief review of the evolution of certain phases of the undergraduate curriculum, of our educational trends, and of the present status of orthodontic education discloses some of the influences which have shaped our course. Tradition has, as always, wielded its generous share of authority. Our native lethargy makes us timid and even suspicious of innovation and experiment. This has hindered our progress and continued a program which was adopted before our present insight was attained. All but a few of the teachers who have guarded the lamp of dental education have offered minimum courses to students. Most of them have, of course, been engaged in private practice which has claimed most

of their time and energy; they have received little or no encouragement and but meager financial support. Social efficiency, which, in the last analysis, is the measure of our meeting the needs of society, has played no part in the organization of our plans.

All statistics reveal a widespread prevalence not only of oral diseases and mutilations, but of malformations as well. The incidence of oral deformities is now known to rank next to that of dental caries. In other words, over twenty millions of children have dental anomalies in need of orthodontic therapy.

In an investigation conducted by the late Professor Forrest H. Orton and by me, of 2,982 students entering the University of California at Berkeley, in August, 1930,[2] the startling fact was disclosed that less than 5 per cent had anatomically correct, unmutilated dentures. These young men and women, ranging from sixteen to twenty-four years of age, a period of life when physical well-being is usually at its optimum, came largely from homes where good health is valued and dental service is gratefully appreciated; in fact, most of them had availed themselves of its ministrations.

During the years 1923 to 1925, Dr. Peter J. Brekhus, of the division of Oral Diagnosis of the University of Minnesota School of Dentistry, collected case records of 9,450 patients.[3] In his study of edentulous mouths he found that only 1 per cent of 4,080 males had lost all their maxillary teeth at twenty years of age; none had lost all their mandibular teeth; and of 5,370 females, none had become edentulous up to and including twenty years. Partial loss of teeth, particularly of first permanent molars began, however, as early as ten years and amounted to 10 per cent for boys and 15 per cent for girls of that age.

In a recent dental survey of the school children of St. Louis, conducted by the St. Louis Dental Society, it was found that 61,124 presented malocclusion of the teeth, which equals 51.4 per cent of the total number of children examined.

It is now widely recognized that dental anomalies predispose teeth to caries and retard development of the jaws and face, that they stand in causal relationship to extensive denture mutilation of late adult life. In fact, orthodontists generally promulgate this truth in full sincerity when they recommend treatment for potential patients; and they are not alone in contending that the entire program of preventive dentistry is largely dependent on a vast extension of orthodontic therapy to the young.

These data show that partial replacement of lost teeth, particularly of first permanent molars, is required at a relatively early period in life; that total replacement of maxillary teeth is more necessary than of mandibular teeth, or of both, but far less common than loss of first permanent molars; that correction of dental anomalies is more pressing than all kinds of replacement service and ranks next in importance to the surgical treatment of caries.

If, as Professor John Dewey says, "the requirements of continued existence make indispensable some attention to the actual facts of the world," *then the time has come to recognize orthodontics as a major division of clinical dentistry.* To a large extent, the organization and management of dental school clinics have been based on the principle of providing opportunity for expert technical training to students in all those operations and procedures which are helpful *after*

diseases have produced their effects upon the teeth and adjacent structures. Preventive measures and control are, however, beginning to claim our consideration, and the care of children's teeth is found to be such a large and urgent need that special clinical divisions are being established in many schools. It requires no prophetic insight to foresee that the data which these new, special clinics will gather will compel that recognition which orthodontics so richly deserves.

Even a superficial consideration of the dental needs of a given community discloses the following: 65 per cent are adults and 35 per cent are children; 95 per cent have caries of the teeth and 50 per cent have anomalies. The incidence of partial and total denture mutilations requiring prosthetic service is not definitely established, but it is considerably less than that of anomalies in need of orthodontic care. Of a group of 11,500 patients of all ages which I recently studied, *only 6 per cent received prosthetic service.*

The Orthodontic Directory for 1932 lists 890 orthodontists who are engaged in practice in the United States, and practically all of them are located in the large cities, which comprise only 36 per cent of the population. Several inquiries, which have been made to determine the number of dentists in general practice who include the treatment of anomalies in the services they render, reveal that 50 per cent do so. Specialists are unanimous in contending that to be able to render such services efficiently requires adequate training and education.

Our educational problems may conveniently be divided into several divisions, namely, preparatory, undergraduate, graduate, special graduate, clinical, etc.

Present-day pre-professional preparation of students is so much better than formerly that a very brief consideration of it will suffice. Table 5 of the Dental Educational Council issued February, 1934, shows that of 1,853 freshmen enrolled in American dental schools in 1933-1934, 61.68 per cent had two or more years of education in a college of liberal arts before entering the professional school of their choice. In addition to adequate credits in the basic sciences of chemistry, physics, and zoology, and a generous minimum of such cultural subjects as language, history, fine arts, philosophy, etc., it is advisable for students to take drawing and shop-practice before entering the dental school. The latter two subjects are aptitude tests for prospective dentists. Ample additional technical preparation is provided in the freshman and sophomore years of the dental course.

Undergraduate dental courses which extend over four college years offer a total of 4,400 hours of instruction, or 1,100 hours per year. A noteworthy feature of the undergraduate curriculum is the inadequate amount of time allowed for orthodontics—usually from 96 to 128 hours. This was characteristic of former days when anomalies were considered unimportant.

In the final report of the Curriculum Survey Committee of the American Association of Dental Schools, after three years of diligent study a recommendation was made to increase the number of hours for instruction in orthodontics to 267. While this offers a marked addition of time, the report also allotted 597 hours to operative dentistry and 926 hours to prosthetics. The total time thus divided by the committee for these three major clinical divisions amounts to 1,800 hours in round numbers, of which, as stated, only 267 were apportioned

to orthodontics. I am convinced that most of our difficulties are chargeable to this wholly inadequate and extremely superficial instruction which is given to undergraduates. Unquestionably, a clinical division as necessary and intricate as orthodontics should be supported by an obligatory minimum requirement of at least 500 hours of training and instruction.

The 500 required hours are for the following necessary courses: (a) principles of orthodontics, a course of 32 illustrated lectures on fundamentals, yielding 2 units of credit; (b) essentials of mechanotherapy comprising 32 lecture demonstrations for (c) technical laboratory course in mechanotherapy (total for b and c, 128 hours and 4 units); (d) introduction to clinical orthodontics for juniors comprises 16 clinical lectures and 48 clinic periods requiring 160 hours and yielding 2 units of credit; (e) clinical orthodontics for seniors includes 64 clinic periods requiring 192 hours and yielding 4 units of credit. These courses demand a total of 512 hours and produce 12 units of credit. They provide clinical instruction for the student during two years of his course, which is essential and undoubtedly better than short special courses after graduation.

If course (d), introduction to clinical orthodontics, is properly planned, the student will be competent in the arts of diagnosis and prognosis and thus be able to avoid all the difficulties and embarrassments so common today. He will be able to judge the needs of a given patient at various age periods and be better qualified to recommend the specialist for extreme anomalies, even in their earliest stages.

It is generally argued that the total available time for undergraduate instruction will not permit such expansion for orthodontics, but it is quite illogical to allot so much time to prosthetics, a service which should not be a goal for dentistry. As already intimated, in former times such surrender to prosthetics may have been permissible, even necessary. But as we go forth with our preventive programs we must weigh the matter thoughtfully.

The time requirements of the treatments of many kinds of anomalies, which prevent their completion during one school year, are liable to yield a large number of unfinished cases which may easily become a burden to the clinic staff. Such a predicament must be prevented by exercising great care in the selection of cases, by providing an adequate and capable staff during the interim between classes and by limiting the assignment of difficult cases to graduate students who are planning to specialize.

Graduate courses leading to a Master's degree demand from 24 to 30 units of credit and a thesis. Most of these credits may be earned in orthodontics if advanced courses are offered. A number of courses in related fields are desirable, however, even though they make large demands on the student's time. If the more comprehensive undergraduate course outlined above were an established fact and our graduate students came thus prepared, it is readily seen that they could engage in advanced work of real merit. Research in numerous phases of orthodontics could thus be undertaken, and therapy might be advanced more rapidly.

It is unfortunate that some of the men who have entered our ranks were very mediocre students of dentistry. Some had failed in the art of prosthesis

and were incapable of placing artificial teeth on a wax base in an acceptable manner, yet they believed they could master the far more difficult art of arranging the natural organs of a living child. Lack of appreciation of the facts of oral pathology has led others to do more harm than good. As the quality of instruction in all our schools is raised, such failures will decrease. It seems unreasonable to demand that all future specialists should engage in the proverbial five years of general practice before entering the specialty, because that is no guarantee of competency.

Time will not permit me to discuss graduate courses in detail, and it seems unnecessary to point out the urgent necessity of a finer, larger development for them. As I visualize the future of our specialty, I can already see some of the developments in bold outline. Well-prepared graduate students will, doubtless, enroll in greater numbers. Full-time teachers and teaching fellows, excellent facilities and equipment and all the excellence and dignity which the older fields of knowledge have developed, will be ours in fullest measure. One cannot believe that a field as important and helpful as orthodontics will forever be neglected.

Special graduate courses, that is, short courses for practitioner training which do not lead to a degree, will undoubtedly remain, but our enlarged understanding of the complexities of our field must henceforth forbid the production of "specialists" in a fortnight. Short courses on special subjects, on newer developments in a restricted section of our science, for practitioners who are qualified are commendable and should be continued.

REFERENCES

1. Betts, George H.: Social Principles of Education, New York, 1912, Scribners.
2. Forrest, H. Orton, and Lischer, B. E.: Relations of the Human Denture, J. A. D. A. **20**: 1553, 1933.
3. Brekhus, Peter J.: The Loss of Human Teeth, Minneapolis, 1928, University of Minnesota Press.

DISCUSSION

Dr. William J. Gies, New York.—I regret that, in the emergency rearrangement of the program, my presence at this session is impossible. To show my interest and to be present in spirit, however, I submit this very brief and direct summary of what I expected to say extemporaneously from notes, at the session tomorrow.

Education is a process. The product, which is in the mind of the student, is intangible and therefore cannot be measured in terms of any physical standard. The results of an educational process are necessarily judged largely by superficial criteria. Under the circumstances, educationists do what they can with common sense, intuition, and the assurances of probability; and usually determine—or can decide—without serious difficulty when there is too much instruction in one subject and too little in another in any curriculum. Experimentation to fit the shifting circumstances of individual and community growth is an essential feature of every progressive educational program.

Orthodontia is plainly one of the most comprehensive, complex, important, and difficult divisions of oral health service. The outstanding priority of orthodontia—in reasonable demands for attention in systematic dental education—is due to the fact that orthodontic service is concentrated in the health needs of early childhood, for *immediate* prevention and *urgent* treatment, as well as for prevention of potential anomalies and disorders. That instruction in orthodontia in the dental schools generally has been inadequate is everywhere conceded. An experimental effort to make this instruction adequate has long been overdue.

This experimental endeavor should be restricted to university dental schools and to those universities in which the dental schools are *not* required to contribute to the financial support of other departments.

"Organized orthodontia" should decide two essentials in this relation: (1) which phases of orthodontia *general practitioners* should practice; (2) which phases of orthodontia only *specialists* in orthodontia should practice. Having done this for the information of all concerned, (a) all dental schools should be persuaded to provide in their curricula the necessary *undergraduate* instruction; and (b) the dental schools best able to do so should be persuaded to offer adequate graduate instruction, leading to an advanced degree in dentistry or in orthodontia. I suggest (1) that a standing committee be appointed to proceed actively at once, along these constructive lines, in conjunction with similar committees from other orthodontic bodies; (2) that the suggestions in Dr. Lischer's paper be made the starting point in this effort; and (3) that the American Association of Dental Schools be given in March, 1935, the first fruits of this study.

In my report on dental education, to the Carnegie Foundation in 1926, emphasis was laid upon the general facts in my observation that "technics" and prosthetic dentistry were given excessive attention in the undergraduate curriculum to the detriment of other matters of equal or greater importance. I heartily agree with Dr. Lischer in his plea that a more reasonable perspective and a better proportion be attained in the undergraduate curriculum.

Dr. Leuman M. Waugh.—I have had Dean Lischer's paper in my hands for the past ten days. I have read it and re-read it, and concur so heartily, as most of you know from what I have said at previous times, with practically everything that he has said in principle that I shall make this discussion rather brief and to the point of outlining what we feel might be a good basis upon which to begin orthodontic training in dentistry.

I have worked on this problem now for seventeen years, beginning in a school in which there were only a few lectures to the undergraduates, with no opportunity for them to see any treatment, and carrying it through to the point now where we have the work divided, and for the past six years have had all divisions of training that have been outlined in Dean Lischer's paper.

Dr. B. E. Lischer.—The discussion has been so complimentary that I have nothing to add to it. I am indeed pleased that the discussers agree so heartily with what I have said. I want to express my appreciation to the Society for allowing a paper on orthodontic education on its program, which is a full one. Fundamental as the subject may be, generally it is not considered of sufficient interest to bring it up.

IMPORTANT POINTS FOR THE GENERAL PRACTITIONER IN ORTHODONTIA DIAGNOSIS

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IN A.D. 24 a Roman medical writer devoted two chapters of his book to teeth, suggesting that "if baby teeth do not come out at the right time, they should be removed and the irregular ones pushed into place with the fingers."

About the sixteenth century, a Frenchman by the name of Fouchard gave the profession the first published treatise on irregular teeth and developed the first appliances.

Dr. Norman Kingsley in his book published in 1880 says: "To the anatomical, physiological and pathological knowledge required by the operator, there must be added a knowledge of mechanics and a clearness of perception and ingenuity to apply it."

It was not until 1899 that the attention of the dental profession was focused on the importance of jaw development. It was at this time that the late Dr. Angle presented the present orthodontic principles; he wrote at the time: "Much of the success in treating irregularities will depend upon a correct diagnosis and prognosis. This is one of the most difficult problems in the practice of dentistry, and its proper solution must take into consideration the efficiency of the masticating apparatus, the articulation of words, the organism of the teeth, the family type, and relation of the features, and the systemic condition of the patient."

These men were all general practitioners; there was in those days no breed known as orthodontists.

From those first appliances of Fouchard's and the theories of Kingsley and Angle, the evolution of orthodontic diagnosis and treatment has continued to the present day but offers yet its challenge for research work to be done by orthodontists and scientists.

From the history just quoted we realize that our early predecessors had a faint realization that the mechanics of orthodontics, as the years rolled by, would be but a small part of the knowledge required to correct skillfully and successfully these oral and facial deformities.

In the past twenty-five years, orthodontists and scientists in the research laboratories have spent thousands of dollars in studying the biologic, histologic, and physiologic phases of growth and development of the bones of the jaws. The causes of root resorption, for instance, have been painstakingly investigated: i.e., the effect diet has on the changes of the alveolar process when different forces are applied to the teeth by orthodontic appliances. This also includes the foods that are required to keep the proper calcium phosphorus balance in the blood supply because this balance must be correct to make the growth forces operate

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smoothly and harmoniously. Another phase of this research is the extent to which the endocrine glands affect the action of the osteoclasts and osteoblasts and which of these glands are most responsible for the normal or abnormal activities of these bone cells. On the normal activity of these cells depends the success or failure of orthodontic treatment.

All this scientific research has been linked with that for the prevention of the various infections of the oral cavity; the chief difference between orthodontics and all other branches of dentistry is that in the correction of irregularities the orthodontist is dealing entirely with healthy tissue instead of diseased tissue.

I think the following is the accepted description of normal occlusion: "The external curve of the lower arch is slightly smaller than that of the upper so that in occlusion the labial and buccal surfaces of the teeth of the upper jaw slightly overhang those of the lower. The mesiobuccal cusp of the upper first molar is received in the buccal groove of the lower first molar. The teeth posterior to the first molars engage their antagonists in a precisely similar way; those anterior interlock with one another in the interspace until the incisors are reached; these usually overlap the lowers about one-third the length of their crowns." (Angle.)

The abnormal overlap or overbite I shall call to your attention later. Classification of the different forms of malocclusion and deformities of the features is based on normal occlusion; thus, taking normal occlusion as a foundation, the classification of cases into the different types or classes is comparatively simple.

CLASSIFICATION

Class I is recognized by the normal mesiodistal locking of the first permanent molars and a shortening of the anterior growth of the premaxillary bone causing the maxillary incisors to erupt distal to normal and impacting either buccal or lingual the maxillary canines. This usually contracts the mandibular arch in the same manner, unless the maxillary incisors in the course of the eruptions are caught lingual to the mandibular incisors, which will give the appearance of a protrusion and might be mistaken for a Class III.

Time does not permit going into any of the etiologic factors of these cases.

Sometimes both the arches are normal in their mesiodistal growth but have an infraclusion condition of the four or six anterior teeth. A third condition is a slightly narrow maxillary arch with the incisors projecting forward and with the front appearance of a Class II.

Dr. L. M. Waugh of New York City, an orthodontic instructor in Vanderbilt University, suggests an addition to this classification: "In Class I division, the mandible is in proper anteroposterior relation to the cranium, with the maxillary permanent first molars of both sides to the mesial for more than one-half the width of a cusp (meaning an end-to-end occlusion). This condition may be caused in one of three ways: (a) by caries of the proximal surfaces of deciduous molars and canines, (b) by premature loss of deciduous teeth without placement of a space retainer, and (c) by the absence of one or more follicles for a maxillary premolar."

Class II.—When from any cause the mandibular first permanent molars lock distally to normal with the maxillary first molars. This class is divided into two types, each having a subdivision.

Division 1 is characterized by receding mandibular incisors with the maxillary incisors protruding. The subdivision of Division 1 has the same appearance but the molar occlusion is unilateral.

Division 2 has the same distoclusion of the molars, but the incisors are retruding and often have a very bad overbite, permitting the mandibular incisors to occlude with the gingival surface of the maxillary incisors; many times destroying the mucous tissue and even denuding part of the roots of the maxillary central incisors. This last condition is many times found in the mixed denture.

The subdivision of this class has the same characteristics as the main division except that the distoclusion is unilateral.

Class III, Division 1.—Both lateral halves of the dental arches are mesial to normal.

The subdivision is again, as in the other classes, indicated by being only unilaterally mesial and one very seldom seen.

These Class III cases are very often wrongfully diagnosed as protrusion of the mandible, when in reality there is primarily an underdevelopment of the maxillary arch, chiefly in the premaxillary region.

I shall here quote a few definitions of what orthodontic diagnosis constitutes:

Dr. Lloyd S. Lourie: "Orthodontic diagnosis is considering the history, characteristics and extent of malocclusion with its associated abnormalities; and determining what corrections or improvements are possible and advisable."

Dr. Stanley A. MacKenzie: "Orthodontic diagnosis is the determining of the maximum efficiency for a dental apparatus; the determining of the physiologic processes through balance of the opposing teeth and their interdependent parts, the supporting structures. This must be correlated to produce an esthetic effect not only in the arrangement of the teeth themselves, but also in the harmonious relation of the features. In other words, maximum efficiency and esthetics must be considered in all their various aspects."

Dr. B. Holly Broadbent: "I have no definition. I find it necessary to have a set of casts made from plaster impressions, full mouth x-ray pictures of the teeth, a five-foot profile x-ray and profile and front view stereophotographs to scale. . . ."

In the deciduous denture, normal occlusion must be the foundation the same as in the permanent denture, but the deciduous denture case has to be studied from a slightly different angle. The so-called abnormal frenum labii is a much abused organ and is operated on, in the majority of instances, with less excuse than were tonsils and appendices a number of years back. Physicians as well as dentists are offenders in this regard. In a baby, this bundle of fibers is attached to the alveolar ridge, but as the jaws grow and develop, the attachment remains stationary while the growth of the bone progresses downward; so by the time the child is seven or eight years of age, in most cases, it will attain its normal position. If these fibers should become attached on the palatal side, then it may be necessary after the permanent incisors have erupted to remove the muscle at the

point of attachment either by dissecting it out or by electric cautery. I have always cauterized when necessary, as it is more certain to destroy all the abnormal fibers.

Every dentist knows that the crowns of the permanent teeth are as fully developed about three years before the period of their eruption as they will ever become. Bearing this in mind it is evident that by the time the child is four or five years of age there must be a lateral growth taking place which can be determined by 3 mm. between each of the six anterior deciduous teeth, or an average width from canine to canine of 33 mm. to 34 mm. in order to permit the four permanent incisors to acquire their normal positions in the alveolar arch and to erupt in a symmetrical manner. If these spaces have not made their appearance by four or five years of age, it is certain that mechanical assistance should be given. T. Wingate Todd, in his studies, quite surprised us a few years ago at Nashville when he said: "From the twenty-first day after birth to the seventh month after birth is the period of most rapid horizontal development of the dental arches. Then we have a period of comparatively slow horizontal development up to the fourth year. From this age to the seventh year is the second most rapid growth period. After that a period of comparative slowness in development extends to the sixteenth year, and the third most rapid period of horizontal jaw development takes place from the sixteenth to the nineteenth year. Periods of vertical development intervene." Just when this assistance should be begun cannot be answered by any rule which will fit all cases.

I prefer to be guided by what the radiograph discloses regarding the extent to which the permanent incisors' root development has progressed.

In narrower arches, the mechanical stimulation should be instituted as early as five years of age for a few months, then an intermission given and the case kept under observation until the permanent incisors are partly or entirely erupted, at which time additional mechanical assistance may be advisable. On the other hand, in other cases it is better to keep them under observation and to give certain muscle exercises to stimulate bone growth.

The main point to be kept constantly in mind is that we are not dealing simply with teeth but with the growth and development of the bones of the maxilla and mandible.

There are a number of etiologic factors which will act detrimentally from birth, such as sucking the thumb or finger, mouth-breathing, and even prenatal position which might have retarded the anterior growth of the mandible during the fetal stage.

This latter condition must be corrected during the first months after birth through muscle exercise. Dr. Robert Dunn of San Francisco, a few years ago, devised an apparatus to attach to a nursing bottle which worked wonders. This apparatus is described on page 1221, December, 1933, of the INTERNATIONAL JOURNAL OF ORTHODONTIA AND DENTISTRY FOR CHILDREN.

There are two periods when treatment is, in every case, contraindicated; first, when the roots of the deciduous teeth are being absorbed; and second, when the roots of permanent teeth have not reached at least two-thirds of their development. During neither period have we any means of stimulating cell activity—nature in such cases should be permitted to function without mechanical interference.

In the foregoing paragraphs, I have endeavored to describe the diagnostic points and conditions which should be recognized in deciduous cases while they are most submissive to treatment. These children come under the attention of physicians and dentists long before the parents have any reason to suspect that there is any need of orthodontic interference. If either or both of the above do not recognize these conditions because they have failed to make themselves conversant with what constitutes an abnormal condition and so cannot intelligently advise the parents that some treatment should be given—then, they are guilty of gross negligence.

The treatment of such cases is purely of a preventive measure to assist Nature in doing that which she has failed to do, or as Dr. Maxwell Steven of London expressed it: "I look at my orthodontic treatment as merely nudging Nature when Nature lags."

Many general practitioners still insist on giving out the statement that was taught in our dental college many years ago: that no corrective treatment should be considered until all the permanent teeth have erupted. I wonder, when such advice is given, whether, if the dentist had a child of his own with a curvature of the spine or clubfoot, would he consider for a moment waiting until his child was fully grown before attempting to have corrective treatment started? One is as logical as the other. The parent is looking, and naturally so, to the family dentist for orthodontic advice; but the general practitioner should not be expected to make a differential diagnosis.

In considering the diagnosis of cases in which the patients are beyond the age of those just discussed (that is twelve years and older) the question is entirely one of a corrective measure. Irregular or misplaced teeth are a symptom to the orthodontist, just as a pain in the body is to a physician; they are both the result of a condition and not the cause. Naturally, the first step is to diagnose the condition and then to endeavor to analyze the cause or causes for the condition.

I think the time has come when classification of orthodontic cases should be separated from that of diagnosis.

To enter into a detailed description in the abstract of the possible etiologic factors entering into the development of the different classes of cases would be unsatisfactory and confusing. The only way diagnosis can be made of value is by instructions through concrete cases with models, photographs, full mouth radiographs, and charts if desired.

Each class of case may have similar etiologic factors, and the same symptoms or conditions may to some degree enter into the diagnosis of all the different types of cases and their subdivisions. Therefore, I shall try to mention only the more important ones with a few brief comments.

The most commonly observed of the etiologic factors are: lack of lateral growth, loss of one or more deciduous teeth from extraction or part of the tooth from improper contouring of a proximal filling; mouth-breathing, thumb-sucking, and tongue habits from enlarged tongue (hypothyroid condition) usually cause overdeveloped arches (both maxillary and mandibular); other tongue actions such as sucking or pushing the tongue up and forward between the mandibular

and maxillary incisors will overdevelop the premaxillary bone to a very marked degree. Biting or sucking in of the lower lip, sitting or sleeping postures, as first called to the attention of the profession by Dr. Stallard of San Diego about fifteen years ago, may cause malocclusion. These habits, especially the sitting posture, not only produce many narrowed arches but also are the cause of many relapses after retention has been removed.

In closing, I am going to quote a paragraph from Dr. E. W. Patton's paper in the March, 1934, issue of the INTERNATIONAL JOURNAL OF ORTHODONTIA AND DENTISTRY FOR CHILDREN; since I would be unable to summarize my remarks without using almost the same phraseology:

"If you are to be orthodontia conscious, you must study facial balance. Is there symmetry between the maxilla and the mandible? How does the forehead compare in size with the lower part of the face? Is there a stare from the eyes? This is often the result of the lower eyelids being drawn by the facial muscles as the mouth is open in mouth-breathing. Note any habits, muscular and otherwise, while the patient is off guard; particularly observe the tongue, and how it behaves and where it lies when not in the act of speaking. Next, take into consideration the denture. Does the mesiobuccal cusp of the maxillary second deciduous molar fall in the buccal notch or groove of the mandibular second deciduous molar? Look for the same relationship between the permanent molars. See that the maxillary canine occludes distally to the mandibular canine. There should be at least 28 mm. between the lingual surfaces of the maxillary second deciduous molars. As the child nears the age of four and five years, the anterior denture should show a spacing—the so-called 'growth spaces.' The frenum labium is always attached to the peak of the ridge at birth, but as the face grows downward and forward the ridge grows away from this point of attachment in the normal cases. When this does not occur, and there is a space between the central incisors after the lateral incisors have erupted, the frenum should be removed."

HEREDITY*

Viewed and Reviewed by an Orthodontist

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HEREDITY may be defined as the genetic relation between successive generations. In other words, it is what results from the influence of nature in contradistinction to the influence of nurture. Therefore the facts of heredity are important when we are endeavoring to interpret the past, to lay down a modus operandi for the present, or to forecast the future. Environment and function are of great importance in influencing an organism whose fundamental nature is determined within certain limits by its heredity. As Herbert Spencer said, "Inherited constitution must ever be the chief factor in determining character." To which might be added that heredity is also an important consideration when studying the physical nature as to cause, present condition and future development of the individual.

Every living creature arises from a parent or parents more or less like itself; that is, the fertilized egg cell contains the potentiality of an adult creature, whether flower, tree or animal. Heredity is not an entity or a power or principle, but only a term for genetic continuity; it is a relation of resemblances and differences.

THE METHOD OF INHERITANCE

For purposes of brevity, only a slight allusion will be made to methods of inheritance. It is not necessary to suppose that a character is hereditary simply because it has occurred in two or even three successive generations. Let us not ascribe to heredity, family traits which may owe their occurrence to undiscovered factors in the family environment.

It is recognized that there are several modes of inheritance, more or less well defined. Three definite methods may be mentioned here.

(a) Blended inheritance. The special characters of the two parents are intimately mingled in the offspring, and when maternal and paternal peculiarities are seen in any individual the inheritance is called blended.

(b) Exclusive inheritance—also called unilateral or preponderant—occurs when there is an apparent reduction of maternal or paternal peculiarities to zero, so we say an individual "takes after his mother or his father."

(c) Particulate inheritance in which the peculiarities of parents do not blend but are separately expressed.

The rediscovered mendelian theory illustrates and explains these three methods, or variations, of inheritance. It is too well known to require to be set forth here. These discoveries will have a great influence in breeding of animals and cultivation of plants, and in the future may be used to improve human

*Presented to the American Board of Orthodontia.

strains. They are intensely interesting to the scientist but they lack practical application today. An authoritative finding could only be obtained by a close control over a large group of parents through several generations, which is at present impracticable. However, some observations of human families have been made, insufficient in number to establish laws but numerous enough to point the way to the earnest searcher. These will be referred to presently.

INHERITANCE AND ENVIRONMENT

Transmission of acquired characteristics is also a much discussed point. What is an acquired characteristic is an unsettled question. Herbert Spencer recognized its importance; Kant, Weisman, and Joe Pritchard disbelieved that it had any great significance. Gattar was doubtful, but Lamarck as firmly believed in it and summed up as follows: "In every animal the frequent and sustained use of any organ strengthens it, develops it, increases its size; on the other hand, continued lack of use sensibly weakens it, it deteriorates and its faculties diminish progressively."

"I would not in the least," says M. F. Guyer, minimize the part of environment and training, but I would emphasize the importance of the fact that the effects of environment and training depend on how a given inborn constitution reacts. Heredity determines what one *can* become, therefore environment and training, supply, in the main, the means of becoming it." In brief, the issue of human life depends largely upon the endowment individuals have to start with, but obviously the best of predispositions may be warped by thoroughly unwholesome experiences and surroundings, or suppressed by lack of opportunity, or wrong training.

Persistence of certain characteristics is observed in all life through many generations. There is a tendency to breed true. Like does beget like, but there are many variations, not only because of differing parental types but also because of many other contributory and little known causes. Darwin said, "Our ignorance of the laws of variation is profound. Not in one case out of a hundred can one pretend to assign any reason why this or that part is varied."

J. Sim Wallace attributes many hereditary characteristics to the action of hormones. In his book *Variations in the Form of the Jaws* he writes: "Characteristics resulting from the action of hormones are hereditary, but, in truth, when it is said that certain peculiarities result from the action of hormones, little more information is given than when it is said that they result from determinants, or heredity. It must further be admitted that a study of hormones does not throw much light on the abnormal variations of the dental arches and their relationship to the jaws. They (hormones) are intended to control, regulate, and coordinate the relationship of the parts. The only thing which, to some extent, environment is left by Nature to regulate or coordinate is the relationship of the jaws to the muscular stresses required of them. The teeth formed early in life cannot, except in an indirect, general, and most remote way, be made to vary with the strains thrown on them and the jaws in later life. No doubt long periods of evolution give rise to such general hereditary coordination of teeth and jaws as is required for their normal development, and such variations as might take

place as the result of varying environment. Natural selection seems to be speeding up changes in the hormones, causing reduction in the size of the teeth to meet lack of growth from function. Obviously individuals with large and irregular teeth, specially subject to dental caries, oral sepsis, pyorrhea, impacted wisdom teeth, facial disfigurement, and a generally unsatisfactory masticatory machine, are disadvantaged in the struggle for existence. It is presumably for reasons such as these that the teeth are becoming smaller, and the wisdom teeth occasionally being suppressed.'' But Ziegler takes a different stand. It is his opinion that in man the strong dentition of his simian forbears has become weaker, not through disuse, but because the extraordinary increase of the brain has been correlated with a weaker development of other parts of the head.

HEREDITY AND DEVELOPMENT

The age-old problem of whether the egg or the chicken was first produced is little, if any, nearer solution than in Harvey's day. He finished up his essay on the ''efficient cause of the chicken'' by writing ''the egg is produced by the cock and henne, and the chicken out of the egg, yet neither the schools of physicians nor Aristotle's discerning brain have disclosed the manner how the cock and its seed doth mint and coine the chicken out of the egg.''

However, some facts are known. In his work *Heredity* Professor Thomson, Aberdeen University, states as follows: ''We know that the germ cells, and their nuclei more particularly, form the physical basis of inheritance; that there is a genetic continuity between the fertilized egg-cells which gave rise to the parents and those which gave rise to their offspring; that differentiation comes about very gradually—the obviously complex slowly arising out of the apparently simple; that paternal and maternal characteristics are distributed in exact equality by the nuclear or cellular divisions, and persist in the germ cells thereof, though the expression or realization of the bi-parental heritage varies greatly in each individual case; . . . that in a general way the individual development of organs progresses from stage to stage in a manner which suggests a recapitulation of the steps in racial evolution; . . . that minute peculiarities of an ancestor may be handed on from generation to generation, although other peculiarities of that ancestor find no expression; that the offspring of two parents differing in regard to some well-defined character may all resemble one parent as regards that character; . . . that in other cases the expressed inheritance seems as if it were a mosaic of ancestral contributions from parents, grandparents, great-grandparents in a diminishing geometrical ratio according to the remoteness of the ancestors. . . .

''On the other hand, we have still to confess our inability to solve the old problems: how are the characteristics of the organism potentially contained within the germ cells? How do they gradually find expression in development?''

Darwin thought of each living creature as a microcosm containing not only the contribution of the immediate parents, but also ancestral items of remote progenitors.

That the chromosomes are the chief, if not the exclusive, agency of heredity has been established quite conclusively in the last twenty-five years.

Said Kingsley, "A perfect dental development is the result of well balanced and nervous systems without hereditary taint. Abnormalities of development are due to a disturbance of the trigeminal nerve during the period in which the crowns of the permanent teeth are forming and arranging themselves in the jaw prior to eruption, or are an inherited tendency from a like disturbance in one of the progenitors, or are the result of mixing different and distinctly marked types of jaws and teeth by the progenitors. Evidence from a variety of sources goes to show that the forces that preside over growth of the osseous system are separate and distinct from those which originate and develop the dental organs. In an abnormal condition the teeth might be far in advance of the growth of the jaws or they might be equally retarded."

HEREDITY AND DISEASE

Health may be defined as the maximum efficiency and well-being of an organism under given conditions. Disease then is a departure from this maximum efficiency. The transmissibility of disease is a subject widely misunderstood. The following facts may help clarify this subject.

1. The reappearance of a diseased condition in successive generations does not prove that it has been transmitted.

2. Prenatal infection is not inheritance, disease may be acquired through the mother during the fetal period. Microbic disease is never inherited, strictly speaking; if the child is born with such disease, it is by contagion.

3. Inheritance of a predisposition to a disease is not inheritance of the disease. Tuberculosis is an example. Very few children are born tuberculous. The disease attacks those who are equally exposed to the same external conditions of infection very unequally. It is most likely that what is inherited is a deteriorated power of resistance to the tubercle bacillus.

4. Acquired and innate abnormal conditions must be distinguished, e.g., it is shown by E. A. Fay that inborn deafness of both parents is inherited by 25 per cent of offspring, but where both or one parent is deaf as a result of infectious diseases only 2 per cent of the offspring are deaf.

According to Ziegler the term acquired should be applied only to what arises in the individual lifetime from the period of development onward—that is, from rudiments already present in the germ.

The consensus of opinion appears to be that acquired diseases are not transmissible in any sense, but that diseased conditions may arise from germinal variations appropriately stimulated, e.g., obesity and insanity, and possibly gout and rheumatism.

Predisposition may be stated to be the opposite of immunity. Some predispositions are more definite than others, e.g., hemophilia occurs in offspring much more frequently than tuberculosis. Some peculiar cases may be mentioned which offer ground for speculation. Some of these are color blindness, transmitted usually from father to grandson through unaffected daughters; hemophilia, transmitted through daughters but present only in males; shortsightedness and alcoholism.

It is becoming more apparent every day that human structures and aptitudes, no less than the traits of plants and the humbler animals, are subject to the well-known laws of inheritance. Certain insanities in man, for instance, behave as mendelian dominants, and hereditary feeble-mindedness acts as a mendelian recessive. "And as any one of these characteristics can be removed in subsequent generations by the plant breeder, no less surely can the terrible maladies of man be largely eliminated if we but follow the obvious path marked out by our present knowledge of heredity," Michael F. Guyer.

Let us now consider certain defects, malformations and other abnormalities. Inherited defects include: hornless cattle, earless sheep, tailless cats, short-tailed dogs. Albinism, or absence of pigment, is frequently inherited in man. Many families traced through several generations have similar imperfections of growth. In one family many members have all fingers two-jointed; another family had a shortening of the metacarpal bone of one finger, through six or seven generations; and other various and numerous malformations have been reported.

Along with defects of parts we may include imperfections due to an arrest of the normal course of development at certain stages, likely through inadequate nutrition or deficient developmental vigor. Harelip and cleft palate are the persistence of a normally transient condition; they are caused by disturbance during fetal life. They occur repeatedly in a family tree. Hutchinson has recorded harelip in ten members of a family of twenty.

Certain peculiarities of eyes and teeth occasionally recur repeatedly, but it is most probable that what is really inherited is the deficiency of developmental vigor accentuated by nutritive defects in mothers during gestation. Many have noted the deficiency of certain teeth, most commonly third molars, maxillary lateral incisors, and mandibular premolars. Inquiry almost invariably results in finding similar deficiences in other members of the family.

HEREDITY AS A FACTOR IN MALOCCLUSION OF THE TEETH

Let us now examine the records for facts for or against the possibility of ascribing to inheritance, maldevelopment, and irregularities which may be particularly interesting from the standpoint of orthodontia.

There is an ingrafted tendency in all living organized matter to reproduce itself. H. L. Morehouse declares: "Like produces like and children in their main characteristics are like their parents. Whenever the differential cause of a character is a germinal one, the character is, by definition, inherited, whenever the differential cause is environmental the character is not inherited."

Professor Conklin of Princeton University says, "Unusually great or small stature runs in certain families and similarly the color of eyes resembles those of one or more parents or grandparents, in general, also then certain features such as shape and size of eyes, nose, mouth and chin are generally characteristic of certain families."

Whenever we find any departure from what we are likely to regard as the typical form of each tooth, or any disproportion of size in their relation to each other, we shall likely find there peculiarities of descent.

"The transmission by inheritance of a predisposition to a defect or deformity is the result of the same general law of nature which gives the form and features of progenitors to their offspring," N. W. Kingsley.

M. F. Guyer says: "There is a strong presumption of there being an inheritable basis for many of the disharmonies and malformations encountered by orthodontists, although unquestionably such plastic and active parts as the jaws are liable to pronounced modifications of extrinsic factors."

E. Martius wrote in 1905: "For the practitioner the concept of heredity is quite useless and he should not deal with it at all. What is wrought out during the life of the individual can be dealt with. What is due to parents is unalterable." Twenty-five years have changed the attitude of many men, however. For example, Thomson believes that many writers have exaggerated the necessity of the persistence of constitutional taints and defects. Abnormal and morbid peculiarities may be eradicated by the subtle process of germinal selection. Too little is known for any one to be dogmatic. Here is a subject worthy of profound study, research, observation, and experimentation. For though great importance undoubtedly must be given to environment and function, yet these potent influences act upon an organism whose fundamental nature is determined by its heredity, that is, its genetic relation to its forbears.

A. Kadner, of Hamburg, writes, "Even the well-known fact of inheritance of anomalies in families did not induce them (orthodontists) to comply strictly with the laws of inheritance, many denied inheritance totally."

The laws of heredity which rule the inheritance of other organs also prevail in the heredity of jaw structure. Kadner shows hereditary tendencies in shape and size of jaws from actual measurements on a large number of families. In many cases the type of mandible is inherited from the father and maxilla from the mother, and vice versa. He is not enabled to set down a definite law governing such inheritance. Insufficient data have been tabulated, and individuals have been affected by pathologic disturbances to too great an extent to make this feasible yet. But much light is shed on the subject, and the way is pointed for future research. He pointed out that mandible protrusion had been transmitted by the mother to males only, and cited the Hapsburgs as a case. Thus the possible relation to the mendelian theory and the parallelism to hemophilia are evident.

The work of Wood on the royal families, as well as the studies of numerous families by the Eugenics Record Office, and the studies of other workers show clearly and emphatically that mental and moral tendencies as well as distinct abilities and defects are inherited and that they are inherited in an alternative manner. They do segregate sufficiently to show much more plainly in some individuals and in some families than in others, according to A. E. Wiggan, in *The Fruit of the Family Tree.*

While we cannot directly apply mendelism to human beings, because of enormous practical difficulties in the way, yet mendelism has greatly clarified our conception of heredity during the past thirty years. We are therefore led to the conclusion that intermarriage of different races from all over the world, much more prevalent during the last century owing to improved methods of transportation and consequent increased emigration, has caused marked varia-

tions in the size and form of teeth, jaws, and individuals. A negative proof of this is that Dr. Nichols, who spent twelve years (1862-1874) on the Pacific Coast, examined thousands of Indians and Chinese, and found no instance of irregular teeth, all jaws well formed and amply developed. Here we find no intermarriage of different races for hundreds of years. From the foregoing it is a logical deduction to conclude that the great increase in common irregularities is not brought about by so-called civilization, or even refined food, though these may be contributing factors. On the other hand, Sir Arthur Keith holds that this is not the case with Englishmen at least. He says, "Contracted palates, crowded and defective teeth, deformed jaws, sunken cheek bones do not become common in English graves until we reach the eighteenth century. The appearance of these structural changes in Englishmen cannot be attributed to the introduction of any new racial element from abroad." Sir Arthur points out in his "Huxley Lecture" that the teeth show clearly the evolution of structural adaptations. In highly civilized races, teeth are more liable to decay and to irregularities than in primitive races; there is also a marked tendency to a reduction in size and number of the dental series. "It is clear that functional adaptation, so far as concerns the production of teeth, is a property resident in the embryonic tissues; the effect of usage in the parent can have no influence on the machinery which shapes the dental crowns in the mouth of the fetus and infant."

Sim Wallace believes that all parts of the body, including the jaws, have the inherent power to grow and mold themselves in response to pressure strains, and that sexual reproduction permits of relatively rapid evolution and reduction in size of teeth is already working to meet the altered requirements of modern civilized environment. "It is on the variability and size of the teeth that attention may here, for simplicity, be focused. There is for each race an average size of teeth, but there are few individuals who have exactly average-sized teeth. It may be said that one-half of the teeth are above the average in size, the other half below the average. Constantly recurring selection of variations in one direction ultimately gives rise to racial differences." Modern irregularity may be partly explained by the theory that structural modifications, which have been most recently acquired, are less stable and more liable to derangement than those long established. "As far as the jaws are concerned, we may rest assured that no changes of an hereditary or degenerative nature are becoming established in civilized races which would militate against their useful functions or produce septic foci for the dissemination of disease through the individual. It would be much more in accord with the evidence to say that provision is made now as ever for the growth of the jaw to withstand all normal pressure strains, but as the normal pressure strains have been greatly reduced by civilization, and the teeth are not required as once they were, natural selection is tending to reduce their size, so that they will be correlated in size to the pressure strains thrown upon them.

"Natural selection could no doubt provide mankind with sufficient osseous development in the jaws to allow of the regular arrangement of the teeth, just as it provided early Nordic man, but not woman, with heavy eyebrow ridges, when he—not she—was a wild hunter and aggressive pugilist. So long, however,

as no benefit would accrue from this, the teeth will tend to continue to be reduced in size till regularity in their arrangement is re-established. In the meantime we have it in our power to increase the pressure strains by food reform and otherwise. We can also control or banish the noxious agents—caries, toxins, etc.—which prejudice the activity of the muscles and interfere with the normal growth of bone.''

From the foregoing we are forced to the conclusion that it is important to make diligent inquiry as to the physical characteristics particularly of the immediate ancestors. Such information should greatly assist in forecasting the future development of the jaws, and be of some value in the prognosis if orthodontic interference is resorted to.

If there is little or no scientific warrant for our being other than extremely sceptical at present as to the inheritance of acquired characteristics, or better, the transmission of modifications, this scepticism lends greater importance than ever, on the one hand, to a good ''nature,'' to secure which is the business of careful mating; and on the other hand, to a good ''nurture,'' to secure which for our children is one of our most obvious and binding duties.

REFERENCES

1. Brash, J. C.: Etiology of Irregularity and Malocclusion of the Teeth, 1931, London, Dental Board.
2. Conklin, E. G.: Heredity and Environment in the Development of Man, 1932, Princeton University Press.
3. Darwin, Charles: Origin of Species, 1914, Toronto, Oxford University Press.
4. Galton, Sir F.: Archives of Psychology, 1875, quoted by Thomson (Ref. 11).
5. Guyer, M. F.: Abnormality of Teeth and Jaws, Mayo Foundation Lectures, ''Eugenics,'' 1933, Philadelphia, W. B. Saunders Co.
6. Harvey, William: Works and Anatomical Studies on the Motion of the Heart, 1928, Baltimore, Charles C. Thomas.
7. Keith, Sir Arthur: Huxley Lecture, and Five Lectures, published by the Dental Board of United Kingdom, London.
8. Kingsley, N. W.: Causes of Irregularity in the Development of Teeth, D. Appleton Co.
9. Pritchard, J. C.: Researches into the Physical History of Mankind, 1826, quoted by Thomson (Ref. 11).
10. Spencer, Herbert: The Inadequacy of Natural Selection, Contemp. Rev. 63: 153, 1893.
11. Thomson, Arthur: Heredity, 1908, London, J. Murray.
12. Weisman, A.: The Evolution of Theory, 1885, Jena, Gustav Fischer.
13. Wiggan, A. E.: The Fruit of the Family Tree, 1924, Indianapolis, Bobbs-Merrill Co.
14. Woods, F. A.: Mental and Moral Heredity in Royalty, Pop. Sc., p. 15, 1902.
15. Wallace, J. Sim: Variations of the Jaws, 1927, New York, Wm. Wood & Co.
16. Ziegler, H. Ernst: Die Vererbungslehre, 1905, p. 3, Jena, Gustav Fischer.

THE CRISIS IN ORTHODONTIA*

PART I

4. CRITICAL REVIEW OF THE PUBLICATIONS OF J. A. MARSHALL

ALBIN OPPENHEIM, VIENNA, AUSTRIA

(Continued from page 448, May)

THE postulate for experimental work, which I have already stated must, of necessity, also apply to Marshall. If we claim the right to apply to man conclusions drawn from experimental animals and to lay down rules for procedure with patients, we must show that the first requisite for such a procedure was followed: *that the arrangement and conditions of the experiment corresponded completely with the mode of procedure with patients.* Let us analyze Marshall's experiments with this thought in mind.

In Marshall's work on monkeys (1) forms of movements were applied which are not used in orthodontic practice (creation of a diastema), by means of appliances which are not ordinarily used; (2) adjacent teeth were moved in opposite directions (labial and lingual movement, shortening and elongation), whereby the movement of one tooth would necessarily influence that of the other; and (3) forces were applied of an intensity which is unknown in orthodontic practice, or at least should be unknown.

Marshall's experiments were undertaken to clarify the problem of root resorption, which had become acute because of Ketcham's publications.[1, 2] Therefore, before discussing Marshall's conclusions, I should like to make a few statements about root resorption.

We must distinguish between two forms of root resorption. In one form are those well-known, shallow defects on the side of the root, involving the cementum and superficial portions of the dentin, which are the result of lateral pressure of the root against the bone. These defects are always observed when the pressure in the periodontal space has exceeded the physiologic limits. Such shallow resorptions have repeatedly been observed and reported by all men studying human or animal teeth subjected to great occlusal stress, especially in a lateral direction. They are characterized by the fact that as soon as the pressure is relieved, a reparatory deposition of cementum takes place.

These traumatic resorptions must be distinguished from a second form of root resorption for which I have suggested the term "genuine root resorption." The defects in these genuine root resorptions are always localized at the end of the root. In the roentgenogram the root end appears as though cut off with a razor: sometimes only the apex is gone; again almost the entire root has been destroyed. This is the form of root resorption observed by Ketcham. Its

*From the Department of Orthodontia of the Dental Institute of the University of Vienna.

etiology is still unknown; no matter whether it is observed in teeth that have been treated orthodontically or in teeth that have never been treated.

This distinction is not yet generally made in literature, and the equivocal use of the term root resorption for two altogether different conditions leads to misunderstandings. Marshall, too, fails to distinguish between the two forms. This is one of the reasons why the profession was inclined to accept the traumatic resorptions of the cementum and dentin in Marshall's specimens as evidence of experimentally produced true or genuine root resorption. (Gubler,[3] page 1058, and Kronfeld,[4] page 384.)

Marshall began his work in 1927 on 22 monkeys, 11 of which were treated. Up to August, 1934, the findings in 5 animals had been published and illustrated. The findings in other animals were stated only briefly, often in not more than one sentence, so that it is difficult for the reader to get a correct picture of the tissue changes.

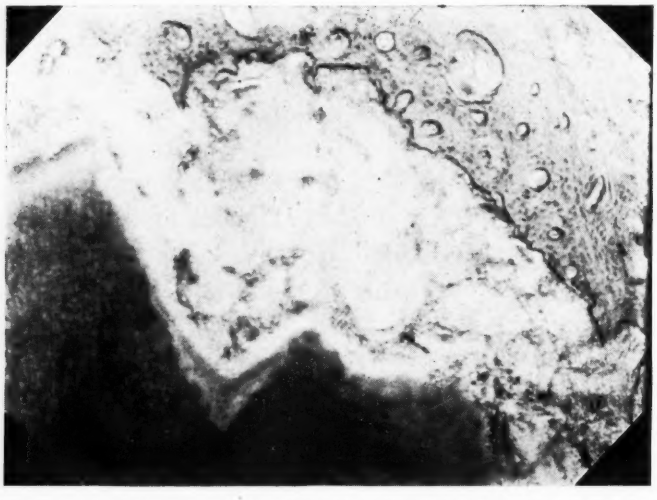

Fig. 1.—Pressure absorption of apex (×100). Hematoxylin and eosin stain. (Marshall: Internat. J. Ortho., 1930, p. 1044, Fig. 17.)

It appears, however, that the resorptions found in these animals were of the kind that follows as a direct cause from forced movement of the root and that is typically located on the *side* of the root. For instance, Marshall reports of one animal:[5] "In another case the tipping of the roots of the first permanent molar drove the roots against those of an unerupted second molar. This resulted in partial lateral absorption of the distal aspect of the first molar roots (Fig. 12)." Of another animal it is stated: ". . . the crown of a maxillary permanent first molar was tipped distally. Thus the mesial side of the roots was absorbed to a significant degree (Fig. 13)." The accompanying Figs. 12 and 13 show typical, microscopically small resorptions of the cementum and of the superficial dentin, for which Marshall's term "eroded cementum" (Fig. 13) is certainly more adequate than the term root resorption if the latter is to include destructions of almost the entire root as shown by Ketcham. Moreover, most of these shallow traumatic defects on the side of the root were already in a state of repair (deposition of cementum) at the time of the animal's death.

The only case of *apical* resorption illustrated by Marshall is reproduced here in Fig. 1. The history of this tooth is given as follows:[5] "The crown of the maxillary molar was tipped distally, for a short time, the induced malocclusion thus driving the crown of the mandibular molar out of alignment and subjecting it to unusually severe occlusal trauma. Later when the pressure was removed, tissue repair commenced" (p. 1046).

From Marshall's report it is not evident whether the tooth illustrated in his Fig. 17 was the maxillary or the mandibular molar. If it was the tooth which had not been moved orthodontically, but had merely been "driven out of alignment and subjected to severe occlusal trauma," then this would be the first case of resorption of the apex of a tooth caused by occlusal trauma. If, however, it was the tooth which was moved orthodontically, then this would certainly have been worthy of detailed description and illustration as being the *only* case of apical resorption orthodontically produced and thus the only experimental result comparable to Ketcham's clinical findings.

Except in two cases (monkeys 2 and 35) in which the apex was involved, all defects found by Marshall in his experimental animals are not true or genuine root resorptions, but are traumatic resorptions of the cementum and superficial dentin on the lateral side of the roots of the type commonly found on the roots of human teeth which are exposed to considerable occlusal stress. These small defects are invariably repaired by the deposition of cementum as soon as the intensity of force decreases. (See Marshall,[5] pp. 1041-1047, Figs. 11-22.)

REFERENCES

1. Ketcham, A. H.: A Preliminary Report of an Investigation of Apical Root Resorption of Permanent Teeth, INTERNAT. J. ORTHO. **13**: 97, 1927.
2. Idem: A Progress Report on an Investigation of Apical Root Resorption of Vital Permanent Teeth, INTERNAT. J. ORTHO. **15**: 310, 1929.
3. Gubler, W.: Zur Frage der orthodontisch verursachten Wurzelresorption, Schweiz. Monatschr. f. Zahnk. **41**: 1011, 1931.
4. Kronfeld, R.: Histopathology of the Teeth and Their Surrounding Structures, Philadelphia, 1933, Lea & Febiger.
5. Marshall, J. A.: Studies on Apical Absorption of Permanent Teeth, INTERNAT. J. ORTHO. **16**: 1 and 1035, 1930.

(To be continued)

ORTHODONTICS AND COMMON SENSE

The Point of View of the Younger Man*

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UNLIKE my more talented colleagues I have nothing new to offer you, no brilliant theories and no results of years of painstaking research. What I have to offer is nothing more nor less than a point of view: the point of view of the younger man, shall we say of the rising orthodontist. It is getting rather late for me to espouse the cause of the younger man, but I hope not quite too late.

From his first introduction to orthodontics the student is both confused and depressed by a subject which never enjoys very great popularity at hospital. The number of patients applying to our teaching hospitals is far in excess of the number which can be treated, and although we try to select to some extent such cases as are suitable for teaching purposes, the claims of the more urgent and the more desperate cases cannot be overlooked. These cases range between a single misplaced maxillary incisor and a hopeless jumble, and in consequence the student is often working in his first few months on cases which would, and in fact do, puzzle the experienced specialist. If we were to disregard altogether the claims of the patients and carefully select our cases for teaching purposes only, it would still be a matter of extreme difficulty to find moderately simple cases with which to start and encourage the new student. Such cases seldom appear at the hospital portals. A condition of irregularity has to be pronounced before it excites the notice of the busy, hard-working parent, and reasonably desperate before that parent is willing to sacrifice the amount of personal time as well as the child's school time, which are involved in a long treatment. This problem of the treatment of the masses is increasing yearly, and is one which demands our very grave consideration. Apart from its bearing on our teaching, however, it does not concern the present discussion, and so I shall not dwell upon it.

Just as the selection of patients falls short of ideal, so also are we handicapped in our methods of treatment and use of appliances. With due regard to the time and interest of the patient, to the skill or lack of skill of the operator, and the expense to the hospital, to say nothing of the waiting list of urgent cases, it is necessary, with a few exceptions for demonstration purposes, to use the more direct methods of treatment and the more simple types of appliance, and on the whole the result is often short of the ideal. In his two years' experience the student seldom sees a case right through from start to finish, and he attains a varying and, on the average, small amount of proficiency. He usually determines there and then to have nothing to do with orthodontics in his practice. If he carries out his determination, this is perhaps just as well,

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for without postgraduate experience he might easily be a source of danger both to his patients and to himself, and his teachers have not failed if they have enabled at least to realize his limitations. Unfortunately, however, he is often tempted in his early days of practice to undertake cases which prove to be beyond his capabilities, and his bitter experience sometimes leads him to condemn the science of orthodontics out of hand. This attitude in the newly qualified man has, in repercussion, its effect upon the student. It is natural for the latter to take more interest in those sections of dental surgery which are going to be a source of bread and butter later on, and in which he can see immediate and satisfying results. And so, by his lukewarm interest, he unconsciously contributes to his own difficulties in the study of a most difficult subject. We cannot criticize the student, we can only sympathize, and wish that circumstances would permit us to make the subject more interesting for him.

Let us now examine the case of the newly qualified man who, one of a minority, considers it worth while to continue the study of orthodontics. Presumably he has been a keen student, and has put himself in the way of acquiring more knowledge of the subject than have most of his fellows. As you know, the amount of work a man does at hospital depends largely on himself. Even so, his knowledge is mainly theoretical, and his practical experience extremely small. The obvious thing for him to do is to apply for a post on the orthodontic staff of a teaching hospital. Such vacancies, however, are few and far between. Let us suppose that he is unlucky. He is thus left to his own resources to acquire such knowledge and experience as will fit him to practice as an orthodontist. He attends these meetings, those of the British Dental Association, and international meetings when and where he can. He hears papers and discussions on subjects which are mainly concerned with research, and shall we say advanced orthodontics, which though helpful are a little above his head. He sees a few masterpieces of finished cases demonstrated by his peers. The fact that they are masterpieces indicates that they are exceptions rather than the rule. He assumes that they are the rule. He sees also a multitude of most elaborate and beautiful appliances in which he takes an inordinate and disproportionate interest. He probably uses them without fully comprehending their dangers. With all the world of books at his disposal he lacks nothing in acquiring theoretical knowledge, and so at this stage he would seem to be well equipped with theory, appliances and optimism. This is a dangerous equipment, and with it he goes blundering on as he gradually and painfully acquires the necessary experience. Presently he begins to think for himself, and as it dawns upon him that theoretical knowledge is worth nothing unless properly applied, and that advanced appliances are valueless except in skilled hands, he realizes that orthodontics after all is largely a matter of experience and common sense.

I think I ought to pause here to assure you that this is not the story of my life. But neither is it complete fiction. I seem to have raised the problem of suitable postgraduate facilities for the young orthodontist, of which there is grave need. Undoubtedly something will be done for him in the future. Meantime, I feel, and I have no doubt he feels, that something could be done for

him here. He wants to know more about the elementary principles of orthodontics; he wants to know the snags and pitfalls; he wants to know what cannot be done. Let us start by showing him some of our cases that have not gone so well. He has seen all our best results, and he thinks we are genuises continually performing miracles. Let us show him some of those cases which have presented unexpected difficulties, that have kept us awake at nights, brought early gray hairs to our temples, and made us sadder and wiser orthodontists, that he may not be the fool to rush in where we angels now fear to tread. Perhaps even the angels may derive some benefit from the discussion which will ensue.

Before showing you my instructive exhibits let us discuss a few fundamentals. When undertaking a new case, it is the duty of the orthodontist first of all to determine the condition and degree of abnormality, and to estimate so far as possible the aggravations of that condition which will develop with growth and the eruption of further teeth; to investigate all the circumstances under which he is expected to treat the case; to outline mentally his treatment of the case; to visualize the result; and to endeavor to achieve that result in the shortest possible time. From the outset this is obviously a very tall order, particularly if the patient is very young. It is often incurring a grave risk to determine at once what the ultimate line of treatment shall be, and it is sometimes wise to conduct preliminary treatment and to await further developments before making a final decision. By the word preliminary, I refer to such treatment as the retention of spaces where deciduous teeth have been removed, expansion of narrow arches, raising the bite, using a chin strap in a Class III case, the removal of obstructions to correct occlusion, such as extracting supernumerary teeth, moving an instanding tooth, widening a maxillary arch, and so on.

During this preliminary stage one gets to know the patient, his behavior and habits, the attitude of the parent, and the conditions under which one is called upon to work—a valuable asset in predetermining the ultimate treatment.

I shall not ask your forgiveness for referring to that old bugbear—postnormal occlusion. It has always been a source of surprise to me that, with all the criticism leveled against Angle, no one has ever blamed him for inventing the Class II case! Surely the proportion of failures and partial successes one constantly sees resulting from the treatment of these very difficult cases, would justify a discussion of them at every monthly meeting. To my mind, postnormal cases can be separated into two divisions—apparent and real. Into the first division I should put all those cases in which the postnormality is due to obstruction. The obstruction may take the form of a narrow maxillary arch or an instanding tooth or teeth, most commonly instanding canines. The mandible is held back forcibly in a condition, one might say, of tension, and when released by the removal of the obstruction is ready to move forward of its own accord, or with very little persuasion in the form of elastic traction or inclined plane. Such cases are often gloriously and, be it whispered, surprisingly successful. But they are misleading, and it is often impossible before treatment to distinguish them from the second division, what I call "real" postnormal cases, which presents more difficulty. (I am not considering those cases of

maxillary protrusion in which the jaw relationship is assumed to be normal, but in which the whole of the maxillary teeth have traveled forward.)

In considering treatment of a case by intermaxillary traction let us examine the conditions we have to produce in order to hope for a successful result. One of our problems is to obtain sufficient anchorage to lock the jaws in their new relative position. First, we must assume a full complement of teeth. The loss of one member of either arch may be enough to wreck our ultimate retention. Second, we must, out of the original condition of chaos, produce two perfectly formed arches which, moreover, fit one another in their new position only. By this I mean that a maxillary arch which receives a mandibular arch in normal occlusion will obviously be too large for that mandibular arch in the original postnormal relationship. After this we have to apply traction to the mandibular arch for a sufficient period of time to develop a constant habit, to produce an alteration in the joint, or to effect whatever change we in our optimism hope will take place. During that time no single tooth in either arch must become misplaced by even a small degree, or it is liable to upset the ultimate occlusion, and with it the locking of the bite in its new position. Moreover, the tendency to relapse is very strong, and failure to wear the appliance even for a short period, whatever may be the cause, may defeat months of work. If it is true that some alteration of the joint takes place, then the traction must be started early. This means that these different tasks must be performed to some extent concurrently, and that traction—whatever form be used—must be continued over a long period in order to obtain the ultimate locking of the premolars when they erupt.

It might not be out of place at this point to call attention to the fact that there is a great difference in the conditions which obtain here and in America, from the point of view of the orthodontist. In view of racial and climatic differences our American colleagues have, on the whole, better material to work upon. Moreover, their patients and the parents are mentally more receptive to treatment than ours. Our school system also presents difficulties which tend to hinder our treatment. The town dentist is often able to see his patients only at holiday times, whereas the man who practices in a school neighborhood loses them during their long vacations. Again, one of the worst factors we have to contend with is the condition of the teeth themselves. I think I am right in saying that caries is very much more prevalent in this country than in America, particularly in children, so that many of our cases are already mutilated before we start work. While expressing my unstinted admiration for the ability of our American colleagues, I feel that these points should be borne in mind when comparing their general methods of treatment with our own.

Taking, then, into consideration all the conditions under which normally we work, with particular emphasis on the long periods during which the child is out of reach of the operator, we have to ask ourselves if we can guarantee the result we set out to perform, however hopeful the prognosis. In aiming at an ideal result, with the dice so loaded against us, are we being quite fair to the patient, the parent, and the good name of the orthodontic profession if there is an alternative treatment which would produce a reasonably fair result? I am

not advocating indiscriminate extractions in all postnormal cases, but I do wish to emphasize that the operator and the parent should be aware of what he is undertaking and the possible risk of failure. For his own protection the orthodontist should, at the outset, insist upon such conditions as he considers necessary, and if these are not fulfilled, should be prepared to alter his line of treatment, or, as an extreme measure, give up the case.

Hereditary influence is a factor with which we frequently have to contend, and in this connection I am reminded of a family under my care which is very interesting from the orthodontic point of view. The eldest girl is a case of postnormal occlusion rather of the Angle's Class II, Division 2, type, though not absolutely typical; maxillary front teeth vertical, mandibular incisors slightly instanding, deep but not very deep overbite, side teeth a full tooth postnormal. This condition is associated with a prominent chin and is a family characteristic of the father's side. The result is not unpleasing, in fact, she is a very pretty girl. No doubt you have met the type of case yourselves. To my mind treatment of this case along orthodox lines would completely have spoiled this girl's particular type of beauty. I did not treat it. To tell you the truth I was not asked to treat it. But I must insist that I offered not to treat it before I was not asked to.

The second girl in this family is a case of maxillary protrusion, slightly postnormal, with a normal chin not particularly pronounced. She has complete absence of maxillary second premolar and canine teeth, and has peg-shaped lateral incisors. These deficiencies are probably inherited from the mother's side, as the mother has one lateral incisor missing and one peg shaped.

The youngest daughter has a harelip, and cleft palate on the left side involving the premaxilla only. The lateral incisor was missing, and the central incisor before I removed it was lying in the cleft. Her occlusion was slightly postnormal.

A son who in age comes between the last two daughters, is, orthodontically speaking, normal in every respect.

Another family comes to my mind which may be instructive from the point of view of hereditary influence. The father's occlusion is prenormal though not to a very exaggerated degree. The mother's occlusion is very definitely postnormal. Unhappily none of the five children has benefited by this union to the extent of producing normal occlusion. From what we know of heredity this is what we should expect. (The mating of black and white cats does not produce gray kittens.) Four of the children are definitely postnormal. The fifth, actually the fourth in age, is prenormal, probably to the same extent as the father. The elder two, boys, I treated by conservative methods with moderate success. What has puzzled me about them is that in each case I have reduced the postnormality by about two-thirds. The remaining third, roughly about one-third the width of a premolar tooth, has obstinately resisted treatment. According to the known laws of intermaxillary traction, this last third should have been essential to any degree of success, as it would have meant the comfortable locking of the premolars. But there the jaws remain, greatly improved, but still slightly postnormal. It is some years since treatment was completed and there is no sign of further relapse. These two boys would make ideal demonstration cases be-

cause they always put their jaws together in normal occlusion, where they assert that the position is more comfortable, but in unguarded moments one can see that the result is not so perfect as one had hoped.

There are one or two interesting questions which arise out of these two cases. First of all there is the question of heredity. It must not be overlooked that in treating cases of hereditary origin, one is working against the influence of environment as well, which makes it doubly difficult to overcome bad habits. It is often quite noticeable that such a case improves more rapidly after the child leaves home to go to boarding school.

The second question that comes to my mind is this. In treating a postnormal case by intermaxillary traction, do we move the mandible, or do we in fact move the anchorage, that is, the whole of the mandibular teeth and alveolus? Probably both, and I am inclined to think that it is the jaw which tends to relapse and the alveolus to remain, which would account for the number of partial successes, or shall we be unkind and say partial failures, to be seen in such cases. No doubt the teeth and alveolus of the maxilla also move to a small extent in the opposite direction. I am sure that many of my colleagues have met at least one case of lost chin in which, after correcting the tooth relationship, the chin still remains regrettably lost.

Now the point of view of the younger man is this. It seems clear that in many of our more difficult postnormal cases we do not really know what is going to happen as the result of our treatment, even in ideal circumstances. We can only watch the case carefully and use our intelligence and experience to the best advantage, certain only that the result will show a noticeable improvement. The orthodontist of established reputation can say to the parent, "I will do my best." If he fails to achieve a perfect result, the parent is rightly convinced that no one could do more. The position of the younger man is different. He has to be more definite in his prognosis. If the case does not go so well as he hoped, the parent wishes she had taken the child elsewhere, and no one is really convinced that a better result was impossible. Can we blame him, therefore, if he adopts the more definite and shorter treatment, to obtain what, even if imperfect, is at least a certain result?

I was happy to be present at the last meeting when Miss Smythe showed us some very interesting pictures of Anglo-Saxon skulls, but as I was unfortunately not able to wait for the discussion I do not know what transpired: One point, however, struck me which seems to have a bearing on the question of occlusion. A number of the skulls shown seemed, according to our standards, to exhibit a slight but very definite prenormal occlusion. Was this, in fact, the normal condition in those times? If so, we must assume that the condition has gradually altered with successive generations, that the mandible has in fact swung back slightly. Have we then any right to assume that the normal occlusion—not the ideal, mind you—is not actually a little farther back than the position at the present called normal?

Again, if there is one thing in orthodontics upon which I have always considered one could depend, it is the size relationship of the teeth themselves, on which all rules of occlusion are based: I mean that, apart from occasional local distortions, the length of the perfectly arranged arch of mandibular teeth should

always bear the same relationship to the length of the perfectly arranged maxillary arch; that the total length of all the teeth in one arch divided by the total

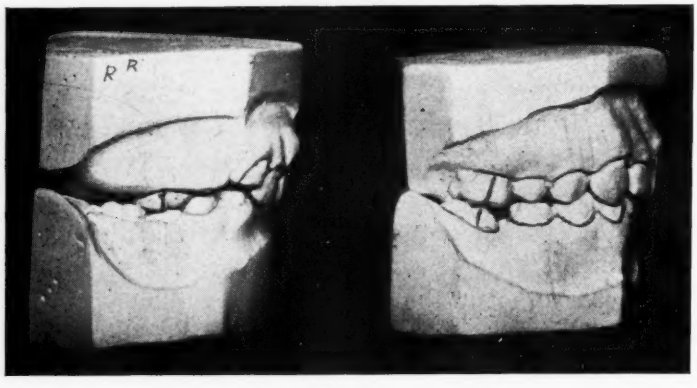

Fig. 1.

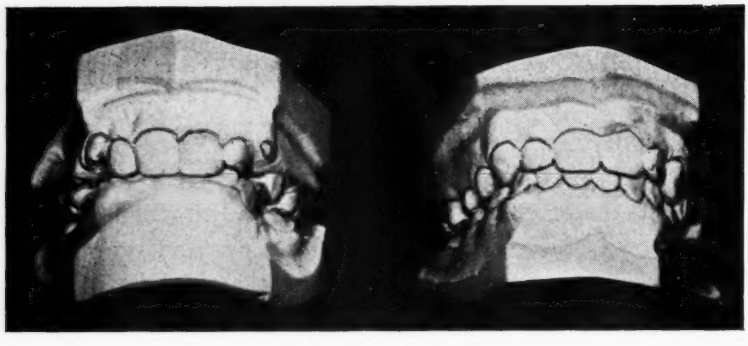

Fig. 2.

Fig. 3.

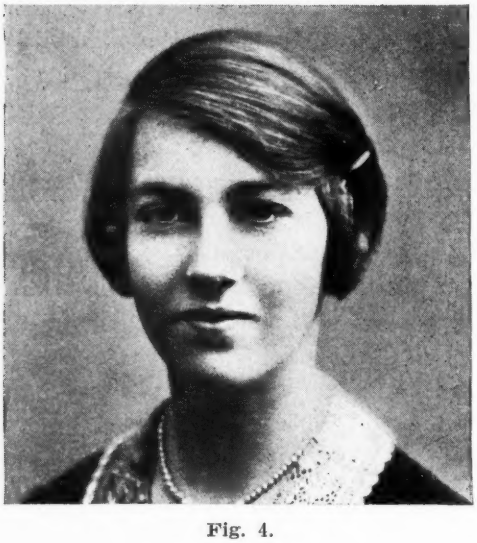

Fig. 4.

length of the other arch should be constant. It struck me that in the Anglo-Saxon skulls the mandibular molars were larger in proportion to the maxillary molars than in the modern skull.

Are we right then to assume that what is normal in one race of people living today is normal in another, that the normal that we assume for the German, the Frenchman and the American may be applied to that famous gentleman of the "stick-out teeth"—the Englishman? I recognize that I am not the first to express this doubt, but while the doubt exists it is bound to influence our ideas of treatment to some extent.

It frequently happens that our enemy, caries, decides the question of treatment for us, and here I should like to mention a treatment which I have sometimes found will make the best of a bad business. We have all, I imagine, met with postnormal cases in which the first permanent molars are carious with perhaps one or two of them completely unsaveable. I am going to show a case (Class II, Division 2) in which I removed all four of the first permanent molars (the Sacred Six) and moved back the maxillary premolars and canines, two by two, and afterward the incisors into correct occlusion with the mandibular teeth. The

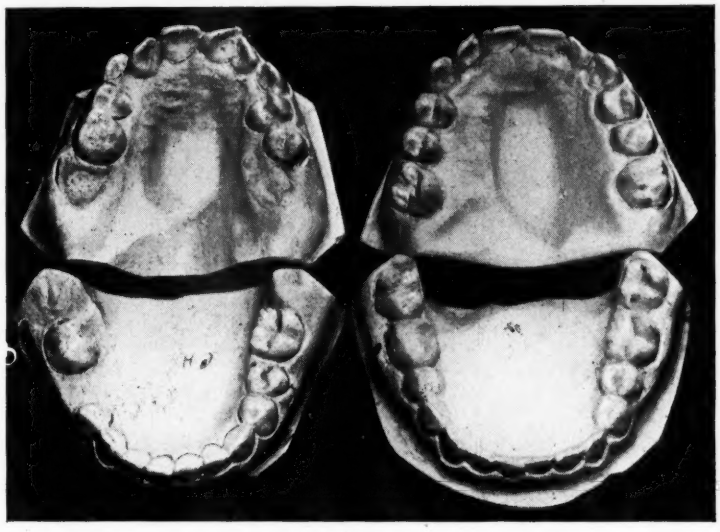

Fig. 5.

maxillary first permanent molars must not be removed until the second permanent molars have erupted sufficiently to be held in position with an appliance, otherwise the latter will move forward as they erupt. One of the disadvantages of this method of treatment is that, the first molar being absent, one is left with inadequate anchorage for a fixed appliance. It is wise, therefore, to do as much work as possible before the first permanent molars are removed and complete treatment with a removable appliance.

Figs. 5, 6, 7 show another case in which I removed the maxillary first permanent molars only. As you see by the result, the maxillary third molars, which will probably erupt early, will complete the dentition. The mandibular third molars must be removed as soon as they appear, as obviously they will be functionless. I had intended to remove all four first permanent molars, but was using a fixed appliance on the mandibular arch at the time; afterward it was too late, and the maxillary second molars had by then come into fairly good occlusion.

It is generally understood that fixed appliances operate from a fixed point of anchorage. There is no such thing as a fixed anchorage in the mouth, and the supposition that there is, gives rise to much disappointment, and a sense of inferiority on the part of the operator. Anchorage in the mouth may be compared with a rowboat on a lake, the water being our anchorage, the oar our lever, and the boat the object to be moved. If the oarsman is rowing skillfully and the boat is well shaped, the water gives way very little, but it does give way in some definite proportion to the force used and to the rate of movement of the boat. If, instead of the water, the boat is propelled by steadying the blades of the oars against two stone pillars the anchorage becomes as nearly fixed as is conceivable,

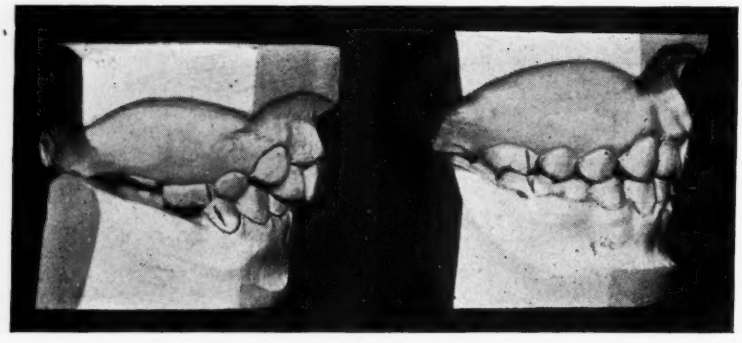

Fig. 6.

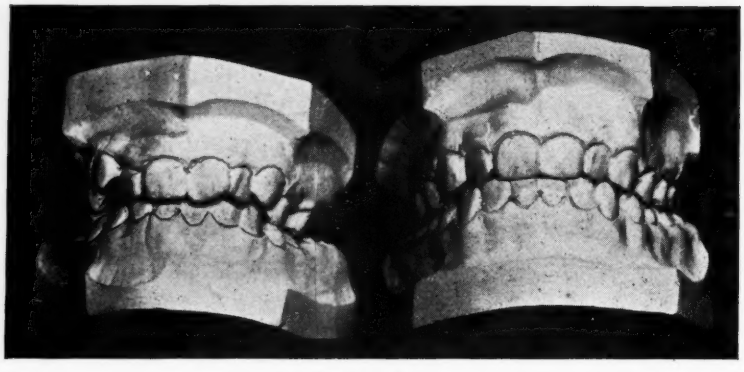

Fig. 7.

but any mathematician will tell you that even the stone pillar gives way imperceptibly according to the force used upon it. In the mouth our anchorage is much more akin to the water than to the stone pillar. This is a fact that must be recognized and duly allowed for in operative orthodontics.

We learn by our mistakes and I am not ashamed to give you an illustration which, if it does not redound to my credit, at least serves to portray my modesty:

The patient, a girl aged seventeen years, had a maxillary left canine tooth semierupted and completely crowded out of the arch, due presumably to early extraction of maxillary deciduous molars. Right side, perfect occlusion; left side, equally perfect functionally, but exactly one tooth postnormal. I removed the first premolar. The canine tooth was not sufficiently erupted to band, and so I made a tiny cavity in the buccal surface and fitted an inlay, leaving the

sprue in the form of a hook. From this I ran an elastic to a band on the second permanent molar. If that canine tooth moved at all it was by the immeasurable amount of the stone pillar. The 5, 6 and 7 all moved forward in about four weeks and only about one-quarter of the space remained. Fortunately teeth

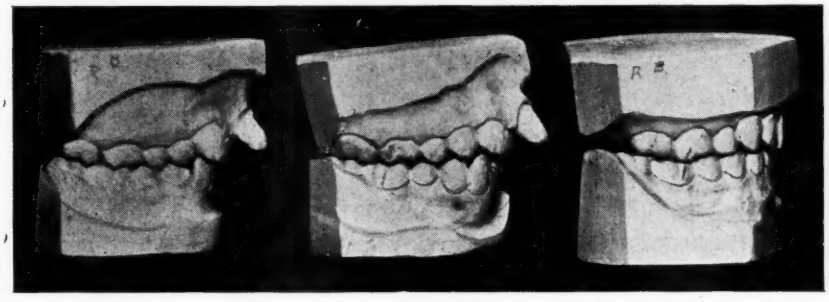

Fig. 8.

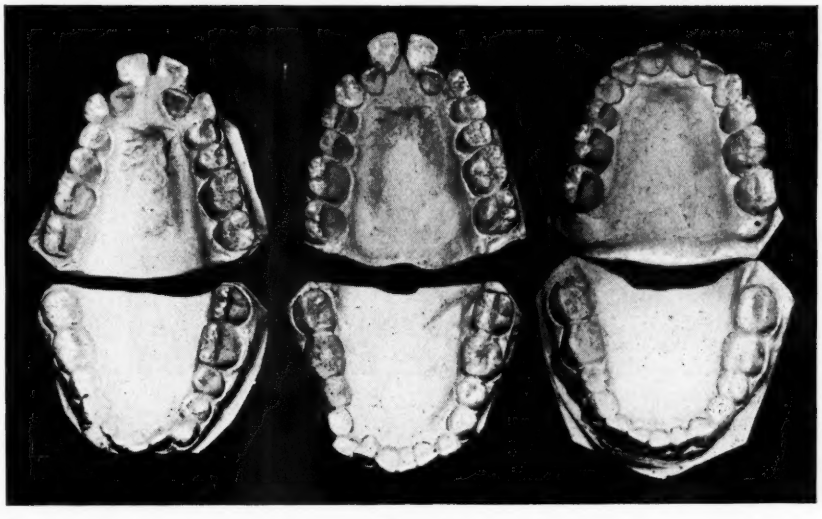

Fig. 9.

Fig. 10.

which have recently moved fairly rapidly can be pushed back where they came from—I wonder if there is any orthodontist who has not discovered that—and this I did with a removable appliance. After that I treated that canine tooth with more respect, and by using the whole maxilla as anchorage, managed to get

it into comparatively good position. As I have no models to show, I do not expect you to believe this, but you will readily believe that I made a hopeless mess of it at the first shot, which is all that is necessary.

Figs. 8, 9, 10 show a Class II, Division 1, case treated by the removal of the maxillary first premolars and one mandibular incisor after expansion of both arches.

It is of interest in showing that in spite of a fair result the maxillary first permanent molars have moved forward considerably during treatment. The case was treated throughout with removable appliances, and the patient was fourteen years old when treatment began.

The case shown in Fig. 11 was treated by fixed appliance; a buccal bow with cribs over the central incisors to prevent upward tilt of the bow and consequent forward tilt of the molars, and elastic traction. The movement forward of the first permanent molars is no less.

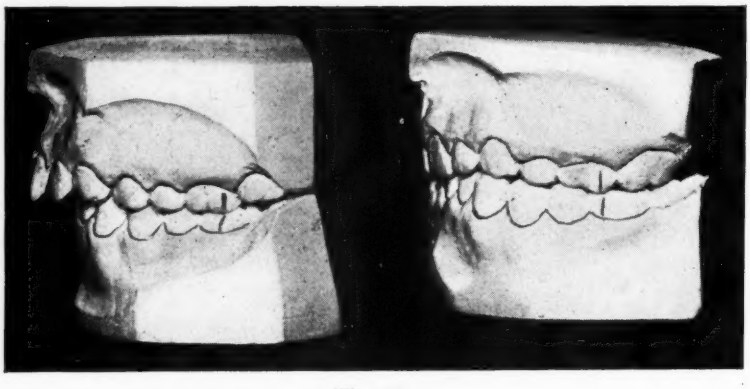

Fig. 11.

My lack of skill may be considered an important factor, but at least it was present in both cases, and it is my humble experience that the molar teeth will move to a certain extent, whatever precautions are taken, and whether fixed or removable appliances are used.

What I wish to emphasize is this: most of us do not pay enough attention to this question of anchorage, and our anchorage value is nine times out of ten grossly overestimated. Let us take for instance the first permanent molar, our favorite point of anchorage. The prevailing tendency of this tooth is to move forward, and if the tooth in front of it is missing or unerupted, nothing but a securely locked bite will stop it from moving forward. It is impelled naturally by the bite of the opposing teeth, by the second and third molars erupting behind and by the growth of the jaw. And yet we cheerfully use it as anchorage in retracting front teeth. (In the opposite direction it is a much more secure anchorage.)

I have shown you that a semierupted canine is worth nearly three times a first molar when the latter is under forward tension. It would be interesting if we could make an exact table of the anchorage value of each of the teeth in both jaws in different directions. We should probably be shocked to find that often

our anchorage is weaker than the teeth we are moving, and that never is the difference between the two so great as we believe.

I think it is of great importance that the student should realize that anchorage always moves, and this movement must be allowed for—never, for instance, try to put a tooth into a space just large enough for it—and that he must multiply and reinforce his anchorage with all the means at his disposal. The Americans in their wisdom are very fond of the two maxillary canines and the two first molars as an anchor foundation, and I think this is very sound. Unfortunately this is usually impossible as we are more often than not moving the canines themselves.

I have tried to raise a few points which may be of interest and possibly of value to the young orthodontist. If in so doing I have appeared to dwell upon matters which to most of you are elementary, I can only apologize and offer as my excuse the title of my paper. And if any budding orthodontist goes away so depressed that he decides to give up the study of orthodontics in favor of some less exacting indoor sport, while regretting the loss of a colleague I can only envy him that contentment and peace of mind which we shall never know until our last orthodontic patient has broken his last appliance.

DISCUSSION

The *President,* on behalf of the Society, thanked Mr. Marsh for his excellent paper. He thought he could agree with him from a teaching point of view that they had far too many cases to deal with. That was his own experience in Liverpool, where there was a waiting list of 70 or 80 patients, some of whom could not be touched for six months. Caries came very largely into treatment. In quite 70 per cent of the cases it was not possible to treat them as one would like, simply because of the carious teeth. He could not quite agree with the author's experience about students not being keen. In Liverpool at present they were very keen. He agreed, as he thought they all must, with Mr. Marsh's remarks about the American nation. Evidently the orthodontists there had better mouths to work on, more bone, bigger jaws, and the retention of all the teeth was more possible than in this country. With regard to the molars moving forward, at a recent meeting Mr. Visick gave an interesting paper on stationary anchorge of molars. He had himself many a time been successful in moving the maxillary incisors back into the space obtained by the extraction of the premolars, and there was very little alteration in the position of the first permanent molar. It depended to a great extent on the way it was done, the amount of force exerted, and the definite upward spring which must be kept on the bow. This spring, at the same time, shortens the maxillary incisors and lengthens the molars and thus reduces the overbite. With regard to simple reciprocal anchorage between the maxillary canine and the first molar, he supposed that Mr. Marsh did not take any precautions to prevent that first molar from tilting. It would have been better, probably, if he had anchored the maxillary canine to the mandibular molars. It would have meant very little extra work, and the canine, he thought, would have gone back all right.

Mr. Harold Chapman said that Mr. Marsh had presented them with such a wide field for discussion that it was difficult to know where to begin. He had made a passing reference, in discussing anchorage, to two pillars. The speaker would rather call them posts, namely, postgraduate and postnormal. After having conducted three postgraduate courses in three different years, in all of which there had been vacancies, he wondered whether there was so much demanded for postgraduate instruction as was made out in some quarters. He had noticed in the *British Dental Journal* that the president of the Eastern Counties Branch of the British Dental Association had suggested that the Dental Board should institute courses at various towns in those counties. If sufficient students could not be got to fill a course in London, he felt doubtful whether the effort could be more successful in smaller towns, and,

moreover, the facilities in those towns would be hard put to it to meet the case. With regard to postnormal cases, Mr. Marsh gave him the impression that he considered the prognosis doubtful. The speaker had come to the conclusion that the prognosis in postnormal cases was best of any, except perhaps Class III; but he (Mr. Chapman) was probably speaking of children of younger age than the cases which Mr. Marsh had put on the screen. In a postnormal case about seven or eight years of age, treated with intermaxillary traction, one could guarantee a good result so far as one could guarantee anything. There was a possibility that the overbite might relapse, and that relapse did not show itself in protrusion of the maxillary incisors, but in a relapse of one or two of the incisors in the mandibular arch. That, however, was a minor drawback compared with the results which were obtained and no case was free from such a probability, whatever the age of treatment. Therefore, his experience was not quite the same as Mr. Marsh's. He had been particularly interested in the author's remarks about the chin, because he had that day seen a child who, four years ago, was extremely postnormal. The postnormality was corrected—almost overcorrected in the circumstances—but the child continued to have a chin which was not pleasing, i.e., underdeveloped. He did not see how any orthodontic treatment could alter such a chin. It might be brought forward, but its shape was the same. He would very much like to know what were the probabilities of that child's chin improving—the chin, that is to say, apart from the rest of the mandible. On the spur of the moment he really wondered whether Mr. Marsh was quite correct in saying that the two arches must always bear the same relation to one another in length. He would have thought that that was not quite true, and the amount of overbite would make a difference. The greater the overbite the greater the difference in length between them. Another point which he was extremely doubtful about—though, of course, it was in the textbooks—was the statement that if one had a well-locked maxillary molar, although the deciduous molar in front was removed, that molar would not come forward. He was inclined to think that that was not true. He had not any actual cases to show, but there were plenty of cases which illustrated the fact that the molars did come forward, and if he wanted to keep that space, he would certainly use an appliance to do so. He did not believe that the locking of the cusps had much to do with it; it was effective for a short space of time.

When he was in Ireland recently, he made some remark that Class II was probably the next most common deformity to that of the normal arch relationship, and he was thereupon told that in certain neighborhoods of Ireland the prenormals were much more common than the postnormals. Therefore, this question appeared to depend on the part of the world in which one lived.

Miss K. C. Smyth wished to say how much she had been interested in the author's remarks about orthodontic education. She did a small part in teaching orthodontics at the Royal Dental Hospital, and had found there that the interest which the student took depended almost entirely upon his being taught fundamentals. When she herself was a student, the teaching at the Royal Dental Hospital in orthodontics was rather patchy. There was no consecutive teaching at all; a few odd ideas were presented by different people at different times, and there was no coherent whole at all which the students could grasp. She did not think that anybody, even of superlative intelligence, let alone average, could make a great deal of a subject if it was thrown at them piecemeal in that way. But she had found that students who were of average intelligence and willing to work, *did* take an interest in the subject if it was taught them in such a manner that there was something in it that they could grasp. As for postgraduate work, it seemed to her that the Society was hardly the place for postgraduate courses. One certainly liked the Society to do all that it could for the advantage of its younger members, yet, when it held only seven meetings a year, it could hardly be expected to devote more than one or two of them to teaching orthodontics. And if some of the meetings were above the heads of the younger members, it was up to those members to get sufficient instruction in other places to enable them to take in what they heard at the Society. If a student was not prepared to pay a reasonable fee for a postgraduate course, he could not complain if he did not understand what he heard at the Society's meetings. Another point was the taking on of cases. She presumed that the

author was speaking about private cases, but it was still more important in the hospitals. It was difficult to restrict the number of cases one took on at hospital. One knew of so many cases where a small amount of treatment given now would save a large amount of treatment later on. It seemed to her that this point of restricting cases was so important that it was advisable not to take on a case unless definite cooperation of the parents was assured; one ought almost to have that in writing. The author had mentioned, in connection with normal occlusion and a normal arch relationship, skulls which she had shown at a previous meeting. She had tried to point out then that the slightly prenormal relationship associated with the edge-to-edge bite, found in many ancient skulls and mentioned by various writers, seemed to be due almost entirely to the wearing down of the cusps of the teeth and the consequent sliding forward of the mandible. In the few cases which she had shown where the cusps were not worn down, a normal relationship did obtain. With regard to the proportion of the size of the maxillary teeth to the mandibular, she could easily make some measurements and find out. As to extraction of first permanent molars as part of the treatment of postnormal cases, of course one did not usually undertake this unless one was forced to it by caries, but when one was so forced she wondered whether the author supposed that there was any optimum age for such extraction. Was early extraction more favorable, or was it better, if possible, to retain for a year or two? With regard to the extraction of four premolars and the resulting flattened appearance of the face, she had seen that very often. Almost the only type of case in which one did not get that flattened appearance was one in which there was prognathism to begin with.

Mr. H. C. Visick said that he desired to speak about the relapsing of Class II cases treated by intermaxillary or other methods. It was said that sometimes the mandibular incisors collapsed. Personally he had noticed a squeezing out of the mandibular second premolars. These, perhaps, erupted in the right place, but later in life, at the age of about eighteen or twenty years, they became squeezed out lingually. When the bite began to close, the mandibular incisors tended to slide up the back of the maxillary incisors, and in that way one had a squeezing out of the second premolars. The author had said that a case of postnormal teeth was often found where the mandible was held back by the maxillary canines, and that if the maxillary canines were expanded, the mandible would come forward. The speaker could not believe that a powerful moving part like the mandible could be kept back by a couple of teeth in the maxilla holding it there. He remembered once before criticizing a statement to the effect that postnormal cases could be treated by a movable appliance, and that induced Mr. Northcroft to bring forward a paper to confound him. It was one of the best papers they ever had, and he only hoped that this remark of his would induce Mr. Northcroft once again to write a paper.

Mr. Cale Matthews said that the paper was an extremely difficult one to discuss, and, as usual in their meetings, the discussion had gone on to individual methods of treatment rather than of general principles. He thought, however, that it was the desire of the author not to discuss individual conditions or methods of treatment so much as to illustrate by the few cases he had shown a breadth of vision whereby the young man for whom he was appealing could envisage his whole method of treatment. Mr. Chapman and Miss Smyth had spoken of the desire—or lack of desire—on the part of the younger men for knowledge on this subject . Either last year or the year before, he himself made a few remarks, bearing on this subject, at one of their meetings, which was very sparsely attended, and the discussion was very "smothering." What he did was to make an appeal for help for the newly qualified man who was eager to acquire some information on the practice of orthodontics, and he appealed to the senior members of the Society that their accumulated wisdom and experience and skill in this respect should not be lost. There did not appear to be, however, any particular desire to make the sacrifice of time and energy which this would involve, and therefore his paper entirely misfired. One got rather tired of this appeal on behalf of the younger man if the younger man did not himself show any great desire to acquire the information which was available. They had just heard that the course given by Mr. Chapman was not filled, and it was limited, he thought, to ten students. In a dental population such as they had in London one would have thought that such a course would

have been overwhelmingly filled. In Birmingham a course, under a different tutor, also in Liverpool, was projected, but owing to lack of support it was not carried through. If there was this great desire for knowledge, at any rate it was not very vocal, and yet at the same time one did feel here and there that there were some people who had not had a great deal of opportunity in gaining experience in this particular work. Why was this? He did not know whether it was the fault of the seniors, but the whole practice of orthodontia had been smothered in mystery. There was really no mystery about it at all. Whether one was successful or not entirely successful one could get results, and in the majority of cases the result which one strove for, given time and patience and the cooperation of parents, could be obtained—at least to the extent of an improvement on what existed before one started. The idea of mystery should be entirely dissipated.

He objected to a phrase in the title of this paper, namely, "common sense." Common sense was one of those things which one rarely encountered, and as applied to orthodontic practice it was a very rare thing indeed. But he felt that in this country we labored under many disabilities. We had not the courage of our convictions. We were accustomed to pay too much attention to precedent and history. We were inclined to conform to all the things that had gone before, and lacked courage. Only that day he was talking to his students and was taking very much the same line that Mr. Marsh had taken, in the sense that they must be able to recognize the conditions which they wanted to treat. That was the primary thing they had to instil into the minds of those they were teaching. They must get rid of the shibboleth of appliances which had grown up during the last twenty years. There had come about an endeavor to accomplish everything at once, instead of taking things quietly in stages, and dealing with the difficulties as they arose. A mental tangle was developing, and the more ingenious and complicated the appliances presented at an orthodontic meeting the more applause they often received. It was necessary to simplify the whole teaching, and to give the students a broader outlook, allowing them to develop their skill and gain their experience. He believed that this paper would help the younger men, and he congratulated the author on his courage in showing unusual cases on the screen.

Mr. E. E. Wookey agreed with Miss Smyth and Mr. Marsh that the subject was taught very inadequately. The result was that when a man started in practice he found himself confronted with extreme difficulties. With regard to postgraduate courses, the pity was that these were so often arranged at a time of day which was impossible for the busy practitioner, namely, the late afternoon or early evening. The fee charged was quite reasonable, but to this had to be added the amount which the practitioner lost in the way of professional fees by his attendance. That might be a reason why practitioners did not take advantage of such opportunities as they should.

Mr. G. C. Friend said that seven years ago, on joining the B.S.S.O., he himself thought orthodontics a minor branch of dentistry, but after a few months he discovered that it was much more than that. It had become a cult, almost a religion! It had a definite creed of its own, and a very small number of high priests who alone seemed capable of dealing with its intricacies. This was very frightening to a young man like himself. But later he took an appointment at a large public school, and there had the privilege of seeing some of the cases which had been dealt with by some of the high priests of orthodontics. That cheered him considerably, for he discovered that men whom he greatly admired and who had been horrified at the idea of extracting a tooth at the B.S.S.O., were cheerfully able to remove the tooth in their own private practice. He also discovered that a large proportion of their cases were unsuccessful, and having listened to their extremely learned papers he wondered whether, in view of these results, it was really worth while to pursue the subject. In his own busy middle-class practice as a young man he felt that he must reduce his orthodontics to straightforward simple cases, avoiding as far as possible all forms of appliances. If he could make his job shorter and simpler by removing teeth he did so. In the past, orthodontics had been largely a matter for the wealthier classes, but those people were not the only ones who wanted the treatment. This treatment wanted spreading over the countryside, but he felt that if that was true the whole thing would have to be simplified.

Mr. J. H. Badcock, who was asked to contribute to the discussion, said that he had only to express his admiration for the paper. It was extremely full of the common sense denoted in its title, and it brought forward a great number of points well worth discussing.

Mr. Bertram Samuel said that in one respect he had found Mr. Marsh rather depressing, for he had reminded him of the passage of time, and of how all their work went round in a cycle, and the conditions of years gone by reappeared again. He remembered that he had written a paper in 1919 on postgraduate teaching in orthodontics, and as the outcome of that, several of them had discussed a postgraduate school for such teaching. Nothing had come of it, and he would suggest to Mr. Marsh that he should take on the mantle now.

Mr. Marsh, in reply, said that although, to his regret, there would not be time to answer all the speakers in detail, he was very glad to have stimulated a great deal of discussion. In fact, the paper had been so thoroughly discussed that not much of it was left. Even the title had been objected to. In advancing the cause of the younger man, he had had no intention of criticizing "us older men." The President had defined one or two of the problems, and he would like to congratulate him on the keenness shown by the students in Liverpool. He thought that the Society would have to move up there very soon! With regard to the retraction of the maxillary incisor, he did use the appliance which Mr. Visick had discussed, and he maintained that the first permanent molars did come forward to a certain extent. Mr. Chapman had told a sad story of postgraduate opportunities not being taken up, but he thought that the fact that the course took place in the afternoons had something to do with it. A man in practice could not get away at certain times, especially about four or five in the afternoon. That had something to do with the poor attendance. Mr. Chapman had mentioned that, when using intermaxillary traction, his patients were of an early age, six or seven years. The speaker would suggest that there was a difference in the case of a little patient at that age. Certainly the effects of environment were most noticeable at that time. He was not casting a doubt upon the success of treatment, but he was trying to show that they did not know whether the alveolus moved or whether the jaw itself moved. With regard to the discussion of elementary matters at the Society's meetings, he was not suggesting that the meetings should be made so elementary as to deprive them of interest for the rest of the members, but that a certain part of the time might be devoted to this serious question of postnormal treatment. Mr. Visick had referred to the squeezing out of the mandibular premolars. He would suggest that perhaps the oncoming third molars had something to do with that. With regard to Mr. Friend's remarks, he thought that the position was that senior men in the orthodontic profession knew very well that the younger man erred on the side of the easier method of treatment. The latter rather tended naturally to take the easier line and to extract teeth willy-nilly. In the endeavor of the senior to educate the younger man out of that tendency, perhaps he erred a little on the side of conservative treatment, and thus there arose the impression that the senior men taught one thing and practiced another. He agreed with Mr. Endicott that the best anchorage for retraction for the maxillary front teeth was intermaxillary traction from the mandible. Mr. Searle had suggested that there ought to be a standard textbook. One of these days the speaker was going to write a book on orthodontics himself. He would call it, "What not to do." It would be an enormous volume, and each yearly edition would be larger than the last, as his own knowledge of the subject increased.

AN OBSERVATION CASE INVOLVING A BROKEN TONGUE HABIT*

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HISTORY.—The patient, a boy aged fifteen years and six months, presented for examination on Aug. 20, 1929. Radiographs shown in Fig. 1 exhibited congenital absence of maxillary right second premolar with too long retention of maxillary left second deciduous molar. Fig. 2 shows the facial form at that time. He was, according to the mother, one month premature at birth and suffered from nutritional disturbances during the first year, but has been a very healthy boy since that time, and his development has progressed normally. His height and weight are decidedly above the average for his age but not in disproportion. At the time he presented, he was a mouth-breather and the bite was open as shown in Fig. 3, in casts on the left in each of the three top rows.

Fig. 1. Fig. 2.

Etiology.—At this time it was detected that he used his tongue abnormally in speech, "tongued his words" so to speak. Previous to this time the boy was not aware of the presence of this habit. I do not wish to infer that the etiology of this case does not include other factors. Undoubtedly, the mouth-breathing habit acted negatively by removing the effect of normal lip position. From facial photographs in Fig. 4, taken in April, 1932, one may be inclined to believe that a growth factor is present. There does appear to be present a condition of bimaxillary protrusion. The face admittedly exhibits marked prognathism. According to the mother, the father, deceased, showed no such facial form, and neither does she. She knows of no other relatives with similar facial form.

Diagnosis.—Bimaxillary protrusion and intrusion of anterior teeth with consequent open-bite, or so-called aclusion, complicated by congenital absence of maxillary right second premolar.

Treatment.—On my advice, the case was put upon observation after the extraction of maxillary first deciduous molars in August, 1929, and maxillary left second deciduous molar in October, 1930. It was very forcibly impressed upon the boy at that time that through voluntary control of his tongue habit, along with careful attention to lip function and position, a correction of the open-bite might be brought about.

*Presented to the American Board of Orthodontia.

Results.—During this period of observation from August, 1929, to the present time, results shown in the second and third vertical rows of Fig. 3 were

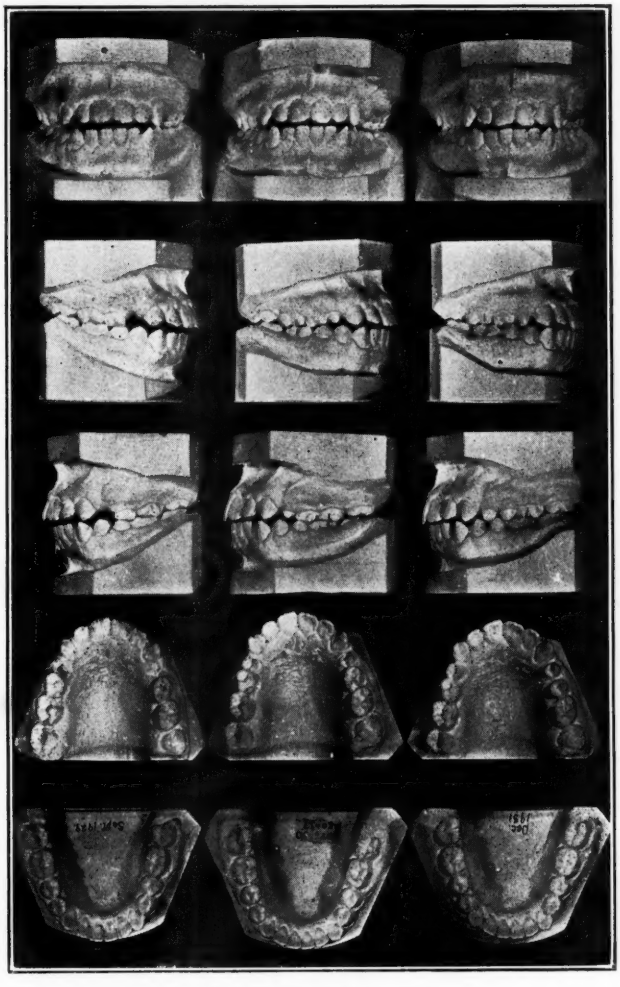

Fig. 3.

Fig. 4.

accomplished. The bite has noticeably closed. The middle vertical row shows views of a cast made in November, 1930, fourteen months after control of the

tongue habit, and the vertical row on the right, December, 1931, twenty-seven months thereafter.

Since the case is still in the process of improvement, I am inclined to expect it to continue. At any time this ceases, I shall advise a short period of treatment. At the next appointment I shall begin to trim the proximal surfaces of maxillary right second deciduous molar according to the technic advocated by Dr. Lourie, in cases of congenital absence of permanent premolar.

This is an example of a case for which, in my opinion, treatment consists of observation. The patient, though unadorned with wires, has nevertheless received the benefits of orthodontic treatment.

DISTOCLUSION CASES*

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THESE five cases have been selected as demonstrating treatments of various types of distoclusions. This subject of distoclusion has probably consistently held the attention of some of the best investigators in our specialty over a longer period of time than has any other single subject. The late Dr. Dewey has written many papers on the subject, and Dr. Hellman periodically brings out additional information concerning the subject. Dr. Simon's work, even though it may be built upon a faulty assumption, has aroused further interest in this subject of distoclusion. Incidentally I think his work may be credited with a decided forward step in the standardization of photography in orthodontia. I am probably more familiar with the work of Dr. Stanton than I am with that of any other investigators. Some of these cases of distoclusion have had maps made according to Stanton's procedure. Such maps cannot help but be interesting, even to those who may disparage their use.

CASE 1.—A girl thirteen years old. As can be seen from the photographs shown in Fig. 1 *A* and *C* the child had a bad lip habit, the maxillary incisors resting on the lower lip. She was a mouth-breather, as is indicated by the sagging facial muscles as well as by her inability to close the lips. A very short upper lip promised trouble when the time would come for the appliances to be removed and this lip would have to be depended on to perform its normal function of holding these anterior teeth in place. It presented an interesting case for diagnosis. To glance at the relations of the models on the left side in Fig. 2, one would say that it was a typical Class II case according to Angle. However, by studying the right side, because of the retention of the maxillary second deciduous molar there is an interesting observation to be made. The mesiodistal relation of the first molars on this side is not as far from normal as is this relation on the other side, a result, of course, of the added mesiodistal width of the deciduous tooth which holds the maxillary molar back. If we extract this tooth and place no appliance, is it not reasonable to suppose that the maxillary first molar will drift forward, assuming a position similar to that of the first molar on the other side and the case will be symmetrical? As this same thing may have happened on the other side, then is it not probable that incorrect mesiodistal relations have been caused as much by a forward drift of the maxillary posterior teeth as by the distal relation of the mandibular arch? The inclination of the maxillary canine roots would also point to this conclusion. I realize that in presenting this case I am immediately entering controversial ground. This must be done, however, in order to justify the procedure of treatment. The

*Presented to the American Board of Orthodontia, May, 1932.

photographs were not accurately made and have no diagnostic value, showing nothing which could not be observed from the study of the patient's face. This has until more or less recently been my contention about all photographs, but I now feel that an effort should be made to relate the denture to the cranium and profile, as a matter of record, whether or not it definitely adds to our information gained from the first-hand study of the face and denture. A study of the maps made by the Stanton method showed that a distal movement of the maxillary posterior teeth as well as a mesial movement of the mandibular teeth was called for.

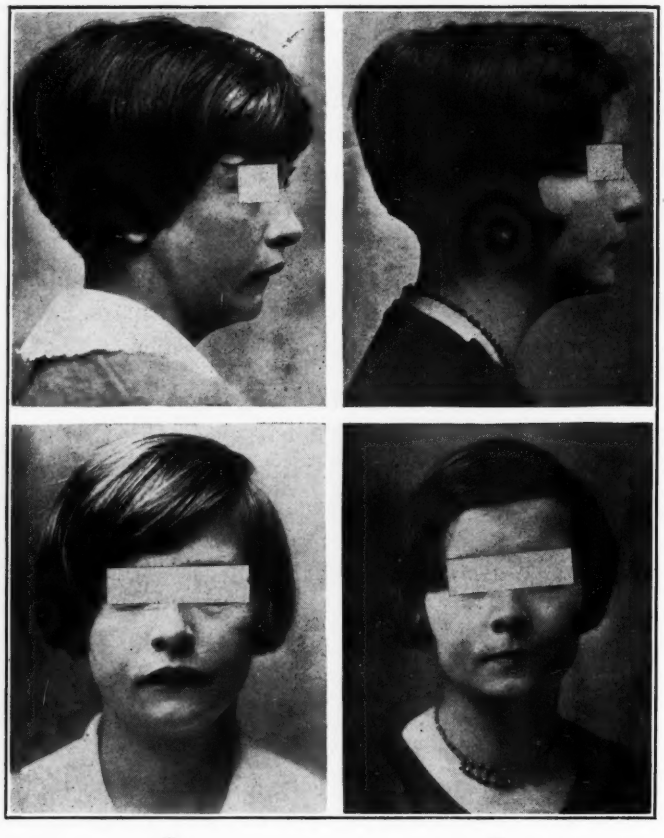

Fig. 1.

Treatment was as follows. The maxillary first molars and first premolars were banded, and a sliding device was soldered to the premolar bands. Another sliding device was placed in a vault wire which was attached to the first molars by vertical round tubes. A buccal arch which was bent up to become a high labial arch in the anterior portion, ran from the first molars through free loops on the premolar bands. Light extensions came from the high labial arch to the incisal edges of the anterior teeth. This whole appliance can be better explained by the drawing shown in Fig. 3. On the mandibular arch a sliding device for expansion was soldered to the first premolar bands with extension to the second premolars, and there was a light buccal

arch which ran from vertical half round tubes on the molar bands to round tubes on the lateral incisor bands. If this case were being treated today, I am sure I would use a much simpler appliance. Perhaps the result would not

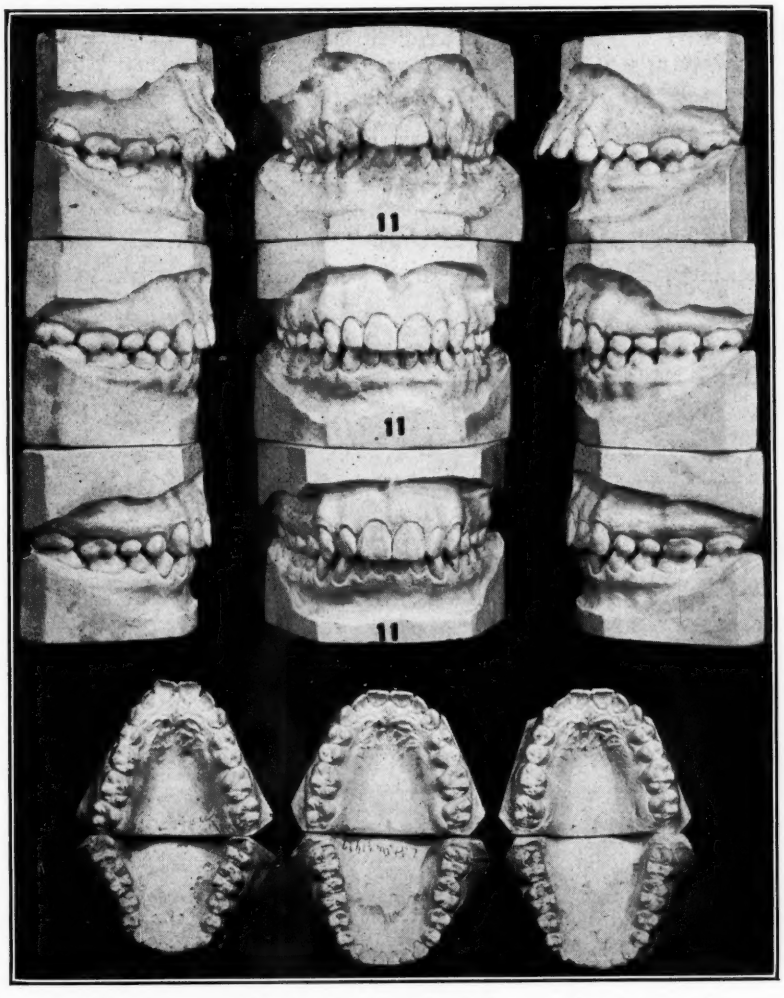

Fig. 2.—Case 1. First set of models made August, 1924; second set of models made August, 1927; third set of models made January, 1932.

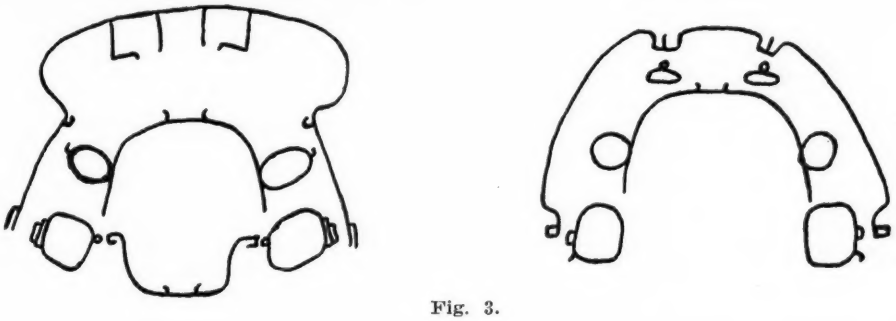

Fig. 3.

be as good. The object of the maxillary appliance was to provide expansion for the maxillary arch and to allow distal movement of the maxillary posterior teeth independent of the anterior teeth. By keeping the springs from the

high labial arch away from the anterior teeth, all the intermaxillary force was exerted against the molars, while, if those springs were bent in, the anterior teeth could be joined into the intermaxillary anchorage. When sufficient expansion had been gained, these first appliances were removed and replaced by removable lingual arches on the first molar bands supplemented by a high labial arch similar to the one just removed, which went into horizontal round tubes on the molars. Elastics were worn intermittently until four years after the start of the case. The model dated August, 1927, shows the case three years after the start of treatment. Auxiliary springs on the mandibular lingual arch finally rounded the mandibular anterior teeth out until they were in their correct relations with the maxillary teeth. However, the model made in January, 1932, four and a half years after the removal of all appliances, shows that the case had relapsed to about the same condition that had existed in 1927. Radiographs taken in 1932 showed four impacted third molars which I advised to be removed. The second set of photographs was taken after the removal of all the appliances, Fig. 1 *B* and *D*.

A comparison of the first models of August, 1924, impressions for which were taken in plaster, and of the last models, which I feel are also accurate, made from dentocol impressions, shows that the distal inclinations of the maxillary canine roots are not so great in the final model as they were in the original one. In other words, these maxillary teeth have had a definite distal tipping movement, as there was no force at any time exerted which could move the roots mesially, leaving the crowns in their original positions. Through long and conscious effort the patient has overcome the handicap of the short upper lip, and now keeps her lips together most of the time. In the final photographs there is a noticeable strain necessary to do this, but the fact that the teeth have remained in their positions as well as they have indicated that much was accomplished in this respect.

Case 2.—A boy twelve years old. He was tall, thin, and stoop shouldered. There was a history of tuberculosis in the family. He cried when his mouth was examined, even though nothing was done at the time. Both the second deciduous molars on the left side were loose, with pus exuding from the gingiva. He was a mouth-breather, and the maxillary incisors rested on the lower lip. His mother was very much concerned about his general health and had already been informed by the family physician that the correction of the dental deformity was essential to the boy's health. Maps were made of this case. I want to call attention to the fact that the incorrect mesiodistal relation on the right side is due as much to a forward position of the maxillary posterior teeth as to a distal position of the mandibular teeth.

The appliances used to start this treatment were sketched on the maps at the time they were made. They impress me now as being rather complicated. The maxillary first premolars and first molars were banded. The molars were held together by a vault wire which went into a vertical round tube on the left and allowed a distal movement of the right molar. There were horizontal tubes on the buccal surfaces of these molars and a buccal arch with extensions to the incisal edges of the central incisors, and an aux-

iliary spring to move the maxillary right second premolar lingually. The distal movement of the maxillary right molar was accomplished by pulling the buccal arch out of the tube slightly, and putting a stop on it, and depending on the intermaxillary force to move the molar back. With the mandibular appliance the anterior teeth were shifted to the left; the canines and first premolars were expanded; and space was opened for the right second premolar. After eight months of use the lingual arch was reshaped to fit the

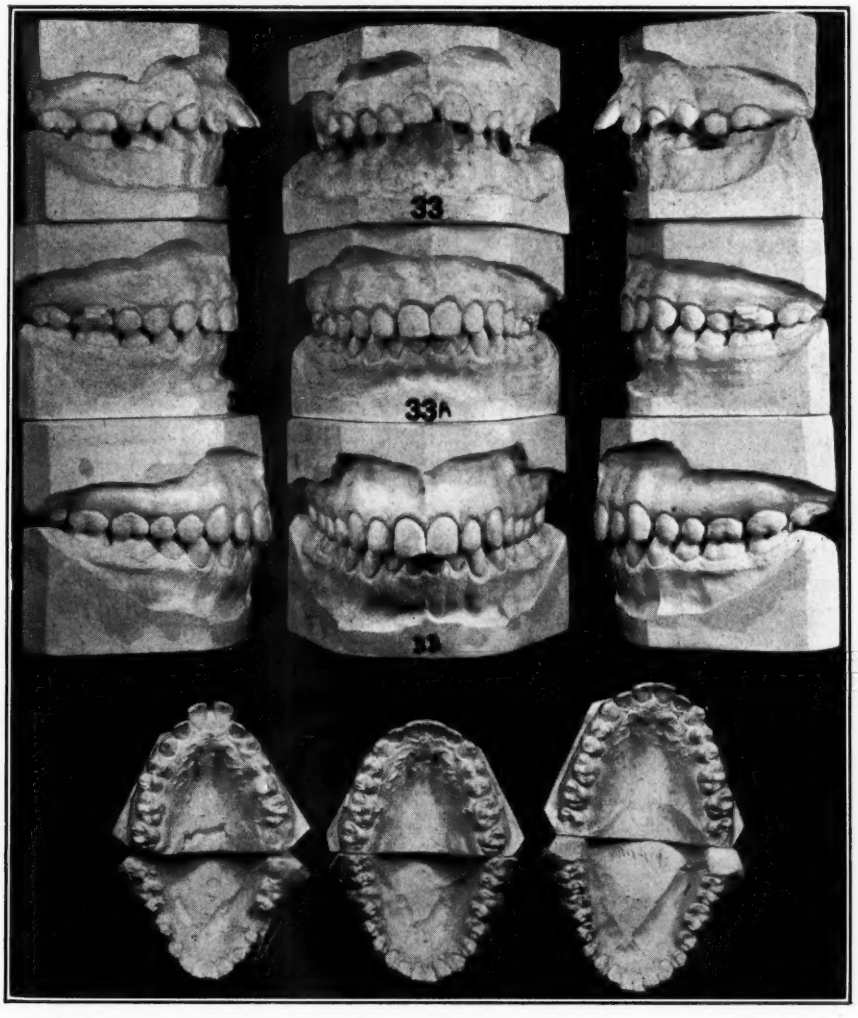

Fig. 4.—Case 2. First set of models made May, 1924; second set of models made January, 1927; third set of models made February, 1932.

teeth in their new positions and the buccal arch was removed. Two years and five months after the placing of the first appliances, retaining appliances were placed. They consisted of a canine-to-canine soldered arch on the mandibular arch, and a buccal and lingual arch on the maxillary teeth. The patient could remove buccal arch for cleaning. The second set of models was made at the time the retainers were placed, and the third set four years after the removal of all appliances, when the patient was twenty-one years old. (Fig. 4.) The

general physical development that accompanied this treatment was remarkable. Just what part the orthodontic work played, of course, cannot be known, but it was a fact that when the relations of the anterior teeth were such that the boy could close his lips normally, he began to breathe through his nose, and within one month gained over six pounds. His posture changed, as did even his mental attitude. The boy became interested in himself. He kept his teeth cleaner. I do not want to create the impression that I am claiming credit for this change, but I do think that the change in his breathing may have been an added impetus to that pubescent spurt of growth which he was about due to have. The impressions for the next set of models were made when the boy dropped into the office for a chat. He is now over six feet tall, weighs 190 pounds, and has become, as he termed it, such a health fanatic that he has, in partnership with another boy, chartered a small schooner of 140 tons in which they carry freight between Halifax and European ports. This may seem wholly irrelevant to this report, but having known the boy at twelve the change in his general physical make-up has been so astounding to me that I ask indulgence for mentioning it here.

Case 3.—This, I believe, would be termed under the Angle classification as Class II, Division 2. There are so many cases almost identical with it that if I were able definitely to state its etiology, then the etiology of a great many cases would be known. Unfortunately I have no photographs of the patient, but if I had, they would show a rounded profile starting from the forehead out to the tip of the nose, and then curving back to a receding chin. It can be claimed that this recession of the lower part of the face is due to the distoclusion, but I do not believe it to be wholly due to this as there are many cases with this same type of profile which have normal mesiodistal relations of the dental arches. Years ago Stanton demonstrated that this type of malocclusion was due as much to a mesial migration of the maxillary posterior teeth as to a distal relation of the mandibular teeth. Later Dr. Hellman, going at the problem in an entirely different manner, arrived at the same conclusion. My own conviction in the matter is that it is often a combination of mesial migration of the maxillary posterior teeth and a distal relation of mandible. If this is true, then it is incorrect to expand the arches and smooth out the maxillary anterior teeth by carrying them forward. Rather should the maxillary posterior teeth have the intermaxillary force applied against them alone instead of the whole maxillary arch. This method of treatment tends to allow the maxillary posterior teeth to move distally and at the same time to develop the mandibular arch forward. Maps of this case indicate the necessary tooth movements. I think this type of distoclusion is quite different from the type which has good mandibular arch width, and the maxillary anterior teeth are not bunched but the lateral incisors flare labially, and the central incisors are tipped lingually. In most of these cases I think there is a true distoclusion, due to lack of forward development of the mandible.

The treatment employed in this case was as follows. The maxillary appliance consisted of bands on the first molars and first premolars. There was

a sliding device between the premolars, for expansion, and a 20 gauge lingual arch going into round tubes on the molars for expansion. Yokes ran from the buccal of the molars through free hooks on the premolar bands. These yokes ended in hooks which offered attachment for the intermaxillary elastics. On the mandibular arch, six teeth were banded, the first molars, the second premolars, and the lateral incisors. A lingual arch with a sliding device was soldered to the second premolar bands, and a light buccal arch ran from the first molars to bands on the lateral incisors. At the time, it was felt that this was necessary to prevent any collapse of the mandibular arch from the force of the intermaxillary elastics. A drawing of this appliance may make it clearer (Fig. 5). With this appliance the mesiodistal relations were corrected; and as the maxillary posterior teeth moved back, the anterior teeth straight-

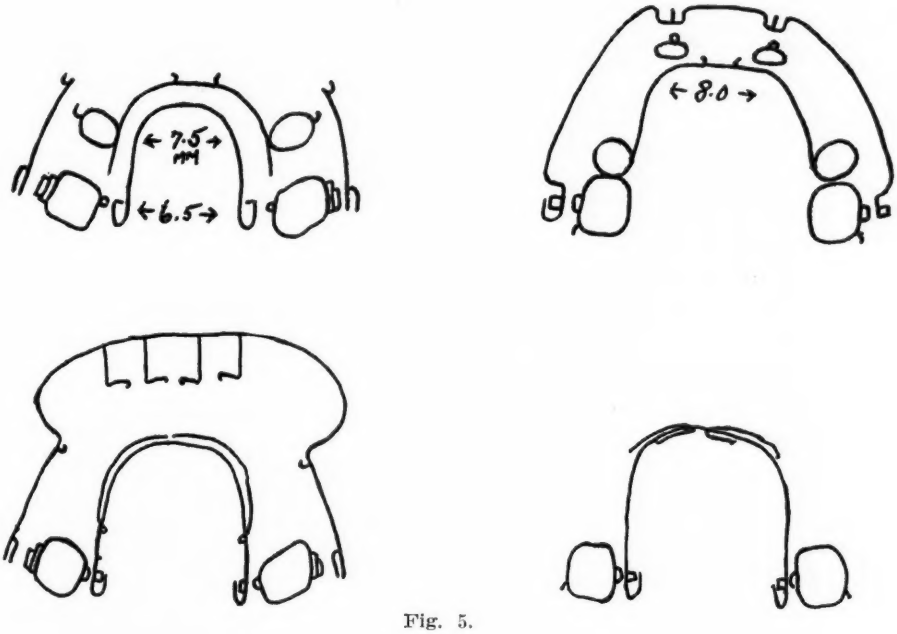

Fig. 5.

ened considerably. The force of the intermaxillary elastics corrected the deep overbite during this first stage of treatment.

After the first stage of treatment, the appliances were changed, and maxillary and mandibular lingual arches were placed. On the maxillary teeth a high labial arch was placed with J wire extensions going down to the mesial corners of the incisors. These pressed on the mesial corners, while auxiliary springs on the lingual arch pressed on the distal. The rotations of these teeth were accomplished without banding any of them. The result shown by the second set of models, made three years later, was satisfactory, but the model made five years after that shows considerable relapse (Fig. 6). This I feel is due to a collapse of the expansion obtained in the canine region and not to any shifting of the intermaxillary relations. It will be noticed that the width between the mandibular canines is even less in the final model than it was in the original one, and the arrangement of the mandibular teeth in the

original model is to be preferred to the final arrangement. Note the difference in the overbite in the second and third set of models and bear in mind that no bite plate was used to obtain the correction of this bite as shown in the second set. The amount of relapse shown in this case was rather discouraging. A great many relapses seem to be due to a collapse of expansion obtained, which indicates that the muscles surrounding the expanded dental apparatus were not in harmony with that apparatus. Muscle training may be the solution for this, but I think there is a great deal more to it than that.

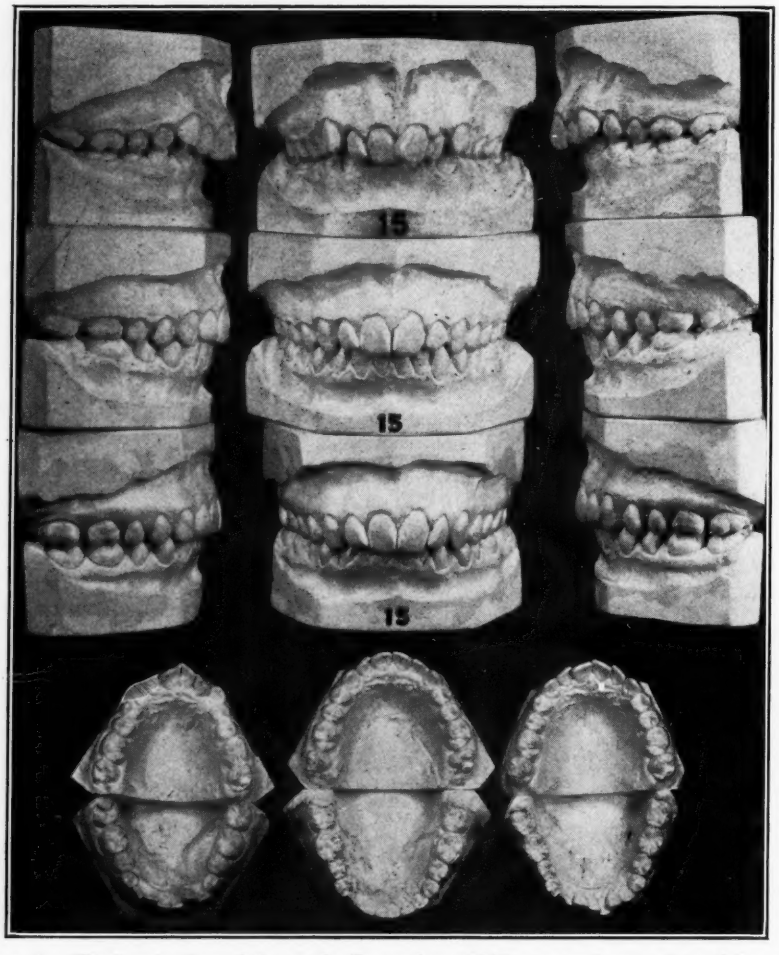

Fig. 6.—Case 3. First set of models made December, 1923; second set of models made April, 1926; third set of models made January, 1932.

Again I regret having no photographs of this case after treatment, but the profile would be found to be still of the same type, with prominent nose and receding forehead and chin. It can be argued that this is due to faulty treatment, but I cannot agree. I think that type of profile is normal for that individual.

Case 4.—At first glance this is a case of unilateral distoclusion on the right side with protruding maxillary incisors. The patient was a girl nine years old, dolichocephalic type, with a bad lip habit, the maxillary incisors

continually resting on the lower lip. The patient was a mouth-breather, although tonsils and adenoids had been removed at the age of seven years. I believe it is generally understood that removal of tonsils and adenoids in cases in which flaring of the incisors prevents normal lip function rarely ever changes an individual from a mouth-breather to a normal breather. The etiology was probably a lack of development of the deciduous denture, complicated by abnormal muscular habits prior to and during the eruption of the

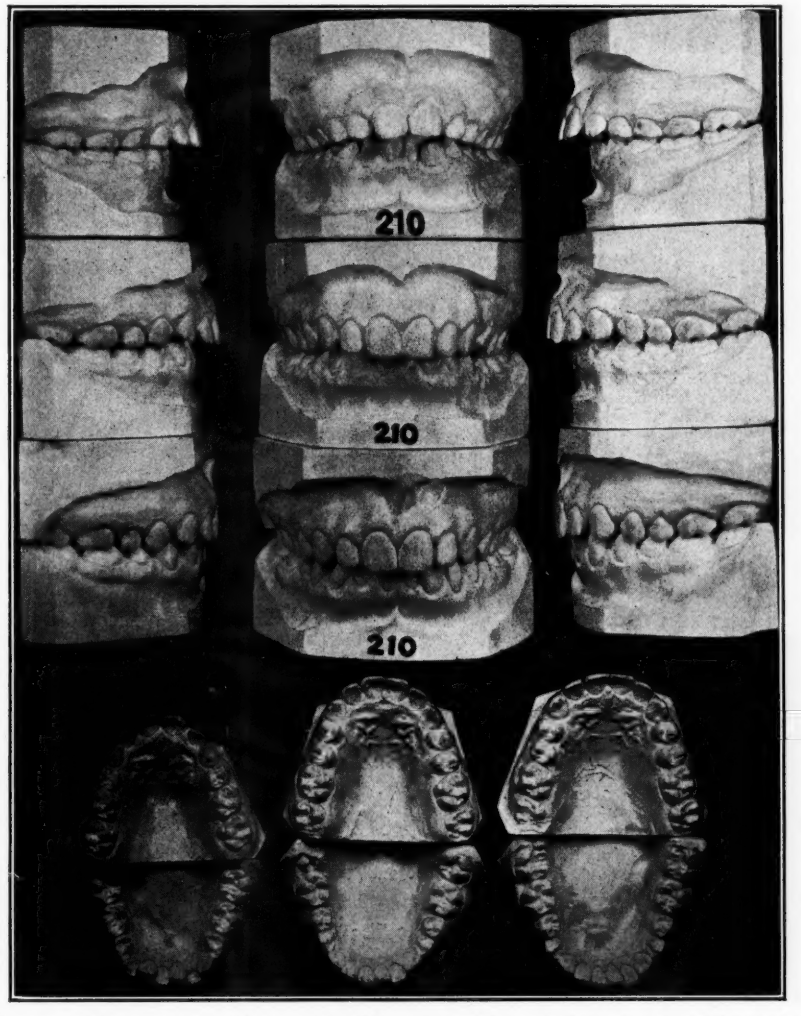

Fig. 7.—Case 4. First set of models made January, 1927; second set of models made October, 1929; third set of models made June, 1931.

permanent incisors. The incorrect mesiodistal relation on the right side was attributed partially to a forward drifting of the maxillary posterior teeth on that side and partially to a distal relation of the mandibular teeth. This conclusion was arrived at by a study of the face in relation to the denture.

The treatment consisted in placing bands on the maxillary deciduous second molars and canines and the mandibular second deciduous molars. On the mandibular teeth there was a removable lingual arch containing a Stanton sliding device, which provided for the expansion of this arch. On the max-

illary arch there was a modified pin and tube appliance, 0.028 gauge, attached to the deciduous second molars and deciduous canines with two fairly large loops in this arch just anterior to the canines. By means of this arch the maxillary arch was expanded, and by opening the loop on the right side and applying an intermaxillary elastic on this side the maxillary posterior teeth were moved distally and the intermaxillary relation on that side was corrected. There was probably some forward movement of the mandibular teeth on this side. After this movement was completed, the loops in the arch were adjusted so that the front section exerted force on the anterior teeth to bring them in. The banded deciduous teeth at this time (ten months after the start of treatment) began to show signs of loosening, so the appliance was changed. The first permanent molars were banded. A removable lingual arch was placed on the mandibular teeth, and a high labial arch was placed on the maxillary teeth with vertical springs to the incisal edges of the anterior teeth. These appliances were used for the next six months; then they were removed to await the eruption of the premolars and canines. After one year's rest period the second set of models was made. (Fig. 7.) It will be seen that while the anterior teeth were improved, the incorrect mesiodistal relation on the right side had completely returned, and there was also a tendency toward a distal relation on the left side. At one time in the previous stage, when the deciduous teeth were still present, the mesiodistal relations on both sides were correct.

In picking up the case again it was decided that the whole mandibular arch was distal about the amount shown on the left side, while on the right side the maxillary posterior teeth were as much at fault as were the mandibular teeth for this incorrect relation. Accordingly the same type of appliance was placed on the maxillary arch as had been placed on the deciduous arch, except of course the banded teeth were different. In this appliance the first molars and first premolars were banded, and a number 0.032 gauge arch was used. The loops in this case were over the canines. On the mandibular arch the first molars were banded, and a removable lingual arch with loops in front of the molar attachments was placed. There was an auxiliary spring on the left side to move the canine and premolars buccally, which would allow the anterior teeth to shift laterally toward that side. In adjusting the appliance the loop in the mandibular lingual arch was closed very slightly on the right, thus allowing a forward movement of the teeth on that side, while the loop on the right side of the maxillary buccal arch was opened allowing a distal movement of the teeth on this side. Elastics were worn on both sides. The mesiodistal relations on both sides were corrected in about four months. By then closing the loops in the buccal arch the maxillary anterior teeth were retracted. Intermaxillary elastics were used at night only to prevent the maxillary posterior teeth from moving forward. When this appliance had been worn for a year, it was removed. The third set of models was made seven months after the removal of the appliances. I have seen the patient recently, that is, fourteen months after the removal of the appliances, and the

relations of the teeth are if anything better than shown in the third set of models. Lip functions are normal; breathing is normal. These conditions apparently corrected themselves after the anterior teeth were in a position to allow the lips to function normally. Ordinarily I would advocate muscle exercises in a case such as this, but this patient seemed to be developing normal lip habits without them so it was not done. Rapid physical development accompanied the second stage of this treatment, which probably accounts for its good response. On the other hand, the ability to breathe normally may have helped with physical development. A study of the first and second set of models of this case might be a good argument for those who do not believe in early treatment, and I hesitate to say whether it was beneficial in this case. Without it, however, the anterior teeth would probably have been still worse instead of slightly improved. The relapse in the corrected mesiodistal relation on the right and the tendency to become distal in the left, are one of the problems for which I should like a solution. I have records of one case which showed almost normal relations of the arches in the deciduous denture and complete distoclusion after the eruption of the premolars and canines. This case had had no appliances placed.

Case 5.—This case shows the treatment of true distoclusion with linguoversion of the left mandibular premolars. The patient was a boy twelve years old. Tonsils and adenoids had been removed at two years. He was well developed physically, brachycephalic type, with a good facial width across the malar region. Etiology of the case was obscure. A spinal injury at birth caused an inability to walk until the child was two years of age; otherwise he was a healthy infant. There may have been some local tooth displacement accompanied by abnormal muscular habit, but the parent knows of no particular sleeping habits. There are three other children in the family, two of whom have linguoversion of mandibular posterior teeth. The abnormality of one child is on the left side only, and that of the other child is bilateral. It would be interesting to know whether some environmental condition caused this similar abnormality in three children out of four, or whether there was a hereditary background.

The first molars were banded, and a lingual arch was placed on the mandibular teeth; with auxiliary springs against the left premolars and the right canine. A lingual arch and a plain buccal arch with hooks for intermaxillary elastics opposite the canines were used on the maxillary teeth. The linguoversion of the mandibular premolars was corrected before the intermaxillary elastics were applied.

At the end of one year's treatment the boy went away to school, and he was referred to another orthodontist for observation. By the time he called on the other orthodontist, the mandibular anterior teeth were striking the lingual surfaces of the maxillary anteriors as a result of the action of the intermaxillary elastics. Some very interesting correspondence ensued, the final result of which was the placing of a vulcanite plate in the vault to open the bite, and continuing the intermaxillary elastics.

Four months later, when he returned to my office, the teeth were in good relationship. The appliances were removed six months later, and the second set of models was made six months after the removal of all appliances. The results achieved, using other results obtained in my office as a comparison, seem to be good. (Fig. 8.) The final set of models was made about a year

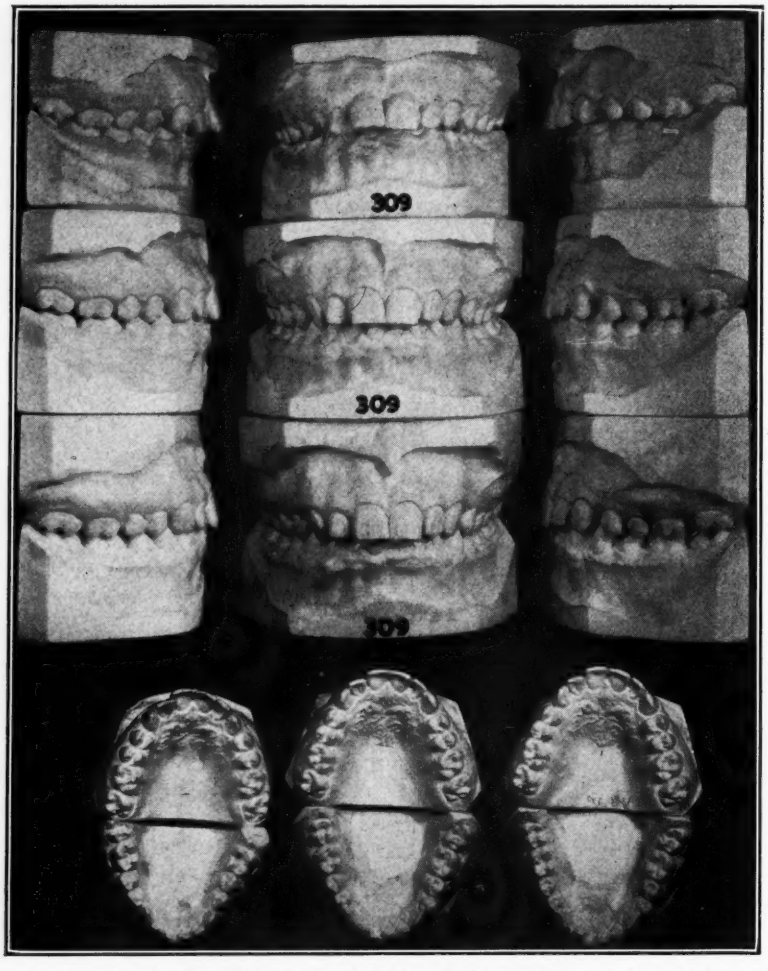

Fig. 8.—Case 5. First set of models made October, 1928; second set of models made January, 1931; third set of models made December, 1931.

and one-half after the removal of all appliances, and there has not been much relapse. The crowding of the mandibular incisors is about as great in the finished model as in the original. In this case no special effort was made to correct this condition, as it would have meant another appliance, and my opinion is that the teeth would have relapsed to about the same position anyway.

SOME RARE FACTORS CAUSING RETENTION OF TEETH*

ELSE LEVY-DAVIDSOHN, HAMBURG, GERMANY

IN ORTHODONTIC practice we very often see partial or total retention of teeth. The cause of this phenomenon varies extremely according to the tooth involved. Statistics show that retention of the canines occurs most frequently, and in most cases a lack of space is the cause. It may be that the jaws are contracted so that the canine erupting rather late does not find enough place in the arch, or that the deciduous teeth have been prematurely extracted so that the premolars moving mesially have closed up the space for the canine.

The same reasons hold true for the second premolars, the eruption of which takes place about the same time. But as the canine is considered one of the most important teeth and the determining factor in the shape of the dental arch and the face, the preservation of this tooth and its movement into place must be striven for by all means. I do not want here to go into details as to how to achieve this result nor to go into those cases in which the radiograms show such a position of the canines that it seems hopeless to try to bring them down into alignment. That is quite another matter.

In cases of retention of the canine the tooth is almost always present. But in the case of the premolars the tooth is sometimes missing, and this is considered a certainty if the lateral incisors are missing. Here, we have to do with a fact of retrogression. Retrogression must, however, be excluded if the central incisor is retained, for up to the present no case of a missing central incisor has yet been observed. Pathologic influences, for example, trauma and inflammations of the jaws, will not be mentioned here. But there is another cause for the retention of the central incisor, which in spite of undisturbed development has not erupted, that is the existence of supernumerary teeth. These teeth are usually found in the premaxillary region in the form of peg or bunch teeth. But as all such teeth lack the typical characteristics of the normal teeth, especially the curvature of the root, they are considered by Herbst-Apfelstaedt only as structures resembling teeth and are called "odontoids."

We have reports of twenty-four such cases, in which the normal eruption of permanent teeth was prevented by those odontoids: fourteen are reported by Bloch-Jörgensen (Copenhagen), two by Kadner (Hamburg), and the remainder by Schweitzer (Berlin). Out of these twenty-four cases, the central incisor was involved twenty-two times and the lateral incisor only twice.

As to the therapy of these cases, I only want to mention that in all the above cases the supernumerary tooth had already fully erupted or was in such a position in the jaw that it could easily be recognized by x-ray examination, which

*Paper read before the European Orthodontological Society at Paris, May, 1933.

of course was of great importance for the therapy. The circumstances of the case I wish to present are quite different.

The patient, G. B., nine years old, became my patient in November, 1932. Her denture, shown in Fig. 1, was of very solid and healthy structure and showed normal occlusion. Though there was plenty of space, because there were even intervals between the single teeth, the left central incisor had not yet erupted. All the other incisors presumably had changed quite normally between six and seven years of age. The first x-ray pictures of the patient were taken when she was about six and one-half years old. This examination only confirmed the

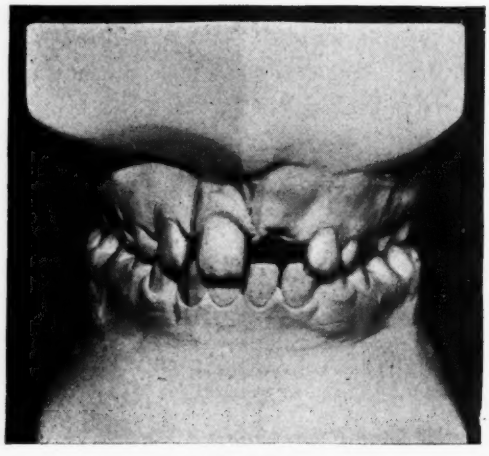

Fig. 1.

Fig. 2.

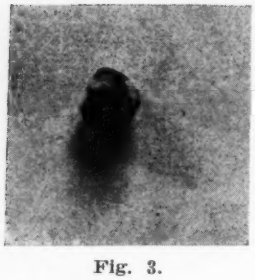

Fig. 3.

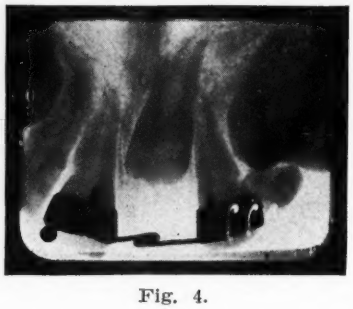

Fig. 4.

presence of the normally developed tooth in nearly vertical position, but otherwise did not apparently clarify the situation in any way. Several incisions of the gum were tried in order to stimulate growth of the tooth, though it can scarcely be assumed that a normally developed tooth should not have the force to pass through the gum. These proceedings were not successful. When the patient was about nine years old, another x-ray film was taken by a specialist. The diagnosis was "crowding of the root of the canine." This diagnosis did not seem very plausible to me, but another thing did impress me, namely, the small spot you can see in Fig. 2 on the distal edge of the retained tooth. This spot could be taken for a filling, but this could scarcely be so as the tooth had not yet erupted. To exclude the possibility of a faulty spot on the plate, a new

film was taken with the same result. This film was shown to the chief dental surgeon at our hospital at Eppendorf, Dr. Pflüger, who explained this discovery as an odontome and advised its immediate removal. At the operation, which took place soon after, a hard structure like a small pea was removed, which is shown in Fig. 3. The histologic examination confirmed this discovery and clearly identified the genetic character of the odontome. All the three hard structures of the tooth could be identified, only in irregular arrangement. At any rate, there was ample justification to speak in this case of an odontoplastic odontome, which is defined by Dieck as a tooth tumor arising out of the degeneration of a tooth germ.

If there is no calcification of this tumor, we regard it as an embryoplastic odontome; if calcification takes place, then it is an odontoplastic odontome, which,

Fig. 5.

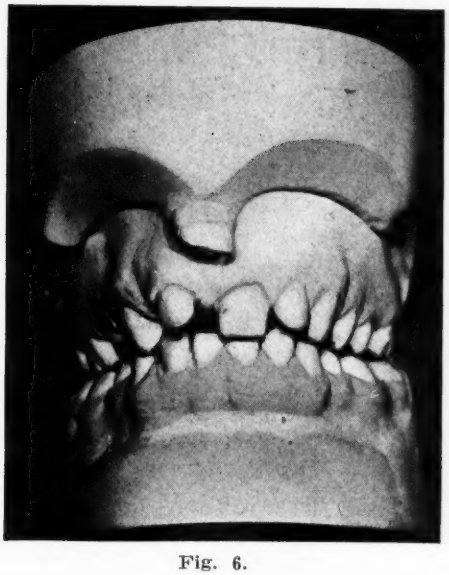

Fig. 6.

according to Dieck, is a very rare occurrence. This case is still under observation. During the operation, we found such a pronounced faulty position of the tooth in the jaw, that, contrary to our original purpose, we decided against orthodontic treatment, but after having removed the obstacle we decided to await the natural movement of the tooth. The clinical inspection as well as another x-ray examination in March, 1933, showed how slowly this movement took place (Fig. 4).

Six months after the operation, the tooth had moved so little that, in my estimation, it will still take a very long time before it will be possible to apply orthodontic treatment to it.

I want to show you by means of a more accentuated case how much valuable time can be lost, with, perhaps, irreparable harm done, if the fact of the retention of a central incisor is merely registered without trying to determine its cause.

The next photographs (Figs. 5 and 6) are of a patient, nineteen years old. The lateral incisor had erupted buccally, the central incisor was prominent and had erupted high above the arch, and was entirely covered by the gingiva, which of

Fig. 7.

Fig. 8.

course caused an extremely disfiguring curvature of the right side of the upper lip and very much hindered the patient when speaking. The patient, a dentist's daughter, stated that when she was six years old the right deciduous incisors

had been extracted. Probably this treatment was intended to stimulate the eruption of the permanent teeth. Nevertheless this condition remained unchanged until her twelfth year. Only then was an x-ray examination made, and seven spread tooth germs were found, and surgically removed. About one year later, the right lateral incisor erupted quite buccally, and only when the patient was sixteen years old did the right central incisor become visible, but in the unfortunate position shown in the photograph. Treatment for correction, begun in 1930 in Berlin, was interrupted after a very short time as the patient left the city. Orthodontic treatment was not resumed until June, 1931, and was unfortunately interrupted by illness of the patient. At first, of course, the space for the tooth had to be obtained by expansion of the jaws. This goal almost achieved, the tooth had to be freed from the gum, which was performed under a local anesthetic. Fig. 7 shows the tooth still covered by the gum, while in the

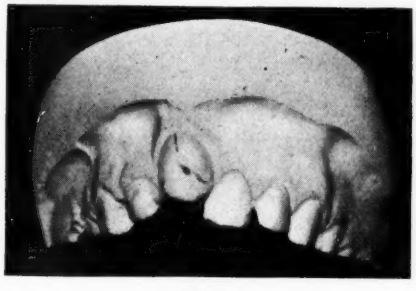

Fig. 9.

following photograph, in Fig. 8, which was made during the operation, the tooth is clearly seen. After a small piece of bone had been removed, it was possible to provide the tooth with a plain band and hook, and bring it down with an orthodontic appliance. This movement was very slow. After a treatment lasting one and one-half years, delayed, however, very much by illness of the patient, the tooth was only in the position shown in Fig. 9. The distance it had moved downward in this time was about 6 mm. The patient already had felt relief from the strain on the lip as well as great improvement in her speaking.

The patient could have been spared this extremely painful condition by earlier diagnosis and treatment.

The principle which the x-ray specialist Robinsohn formulated as early as 1911, namely, that the retention of a tooth never occurs alone but always in conjunction with other anomalies, must always be kept in mind.

To discover the anomalies causing such retentions is our task, and these two reports may help to draw your attention to these and similar anomalies.

TECHNIC OF SOLDERING CHROME ALLOY APPLIANCES USING CITY GAS

MAX R. KADESKY, D.D.S., DUBUQUE, IOWA

APPLIANCES made of chrome alloy have been in use and under close observation for the past year and one-half. I have not experienced the many difficulties which have been reported by others in constructing appliances of this material. Practically no change from the present technic of soldering precious metals is necessary. The operator must exercise more care in removing the wires the instant that the solder flows. The materials used are chrome alloy wires, a special chrome flux, and a low fusing solder (either silver solder or a thin gauge 14K gold solder). This technic eliminates the necessity of using electric welders or spot welding machines.

I would recommend using oralium band material for all bands, precious metal or Aderer's new gold alloy buccal tubes, and the Ellis tube for the one piece lingual arch. By using the Ellis tube a one piece lingual arch can be constructed without soldering a half round post to fit the lingual half round tube. McCoy open tubes or Ketcham hooks are preferred for use with the anterior oralium bands.

After the posterior bands with the necessary attachments for the labial or lingual appliances, or a combination of both, have been constructed of materials which you need not worry about as to the solder unions, you may proceed with the construction of the chrome alloy appliance.

The same gauge wires as are used in precious metal appliances are recommended for the chrome alloy appliances. Shape the labial and the lingual arch as you always have. Mark the location of necessary auxiliaries. You are now ready for the soldering.

The technic for making any union with the chrome alloy wire is as follows:

1. Hold the wire over the flame for two seconds, just long enough to warm it. This takes grease or other foreign substances off, allowing the flux to hold.

2. Apply the flux when the wire is warm. Proper flux is vitally important. The stainless steel flux of the Rocky Mountain Metal Products Co. is the flux which has given me the best results. Flux at least one-half inch. Be sure that flux protects the entire area.

3. Flow the solder on the large wire, using silver solder or 14K gold solder; use more solder than you would in soldering precious metals. Do not hold the wire directly in the flame; about one-half inch above the blue flame is the desirable place for soldering. It is important that the wire be removed the instant the solder flows. If this is not done, the temper of the wire will be lost.

4. If the solder flows slightly but is inclined to ball, stop, apply more flux when warm, and proceed as before. This will not happen if care is exercised in applying the flux and the solder.

5. In adding finger springs, stop loops, and stabilizers, apply the solder to the larger wire as described above. Do not put solder on the smaller wire; it is not necessary. Warm the wire and flux well. Heat the larger wire first; bring the smaller wire to the place of union when the solder flows. Remove the wire immediately. Instant removal of wires at the proper time will prevent loss of temper.

6. While the wires are still warm, plunge them in cold water. This seems to regain some of the temper.

7. Remove the crust that has formed at the solder joint. This may be done with pliers or a knife. If soldering has been done carefully, after the flux is removed you will notice but little if any discoloration or oxidized area. In many instances it is not necessary to dip the appliance in acid or a pickling solution before polishing.

8. Polish the appliance as you would any precious metal appliance. When buffing speed up the motor; for if the wires get warm or even hot, it helps bring back some of the spring that may have been lost. Friction gives hardness and spring to stainless steel.

You will be astonished at the ease of this technic; there is no new electrical apparatus to master, since the wires are soldered with practically the same technic that you follow in your present method. I believe if the proper flux is used and that if this technic is mastered with care to remove the wire as soon as the solder flows, that very few complications will be encountered in using the chrome alloy for orthodontic appliances.

The following materials are recommended for constructing chrome alloy appliances: Hutton chrome alloy wires; Rocky Mountain Metal Products Co. stainless steel flux; oralium band material; Aderer buccal tubes; Ellis lingual lock for one piece lingual arch; silver solder or 14K gold solder; McCoy tubes or Ketcham hooks.

COMPROMISE TREATMENT IN AN ADULT*

LELAND R. JOHNSON, D.D.S., M.S.D., CHICAGO, ILL.

THE patient, a girl eighteen years, eleven months of age, presented for treatment because of linguoversion of the maxillary right canine. Tonsils and adenoids had been removed at six years of age, and respiration was normal. There was no history of any habit, and the frenum labium was normal. It was a case of neutroclusion with both arches a trifle narrow. The overbite of the maxillary anterior teeth was very slight—almost end to end. The median line of the mandible was about 2 mm. to the right. The chin was a trifle prominent but not disfiguring. The father's and mother's teeth are apparently normal, but the brother has a malocclusion and each canine has erupted in linguoversion.

Treatment was undertaken with only one object in view—to place the maxillary right canine in its proper position; although an attempt was made to improve the mandibular incisors.

The etiology of this case may have been the prolonged retention of the deciduous canine.

A compromise treatment was thought best because of the age of the patient and the slight deformity. Lingual appliances were used with finger springs to expand the arches slightly and to move the canine into position. Force was applied for a period of eight months. The patient did not cooperate as well as she should have, and there was a great deal of breakage during treatment. A mandibular lingual retaining appliance was placed and worn only six weeks. The retainer had been off six weeks when the patient was next seen, so all appliances were removed and the patient dismissed.

The occlusion was retaining the maxillary right canine in position; and although there was some relapse in the mandibular incisor region, I consider the prognosis of this case to be favorable.

It was impossible to obtain x-ray pictures of this case after treatment.

My conclusion is that adult orthodontia should be undertaken with the idea that treatment should be limited to the correction of the outstanding deformity in many cases but that extensive treatment should be avoided if there is a fairly good working occlusion present.

*Presented to the American Board of Orthodontia.

Department of Dentistry for Children

OBSERVATIONS ON THE GENERAL PRACTICE OF JUVENILE DENTISTRY

R. McClure Patterson, D.D.S., Detroit, Mich.

THE two outstanding factors in the care of children's mouths, if my observations are correct, are the guidance to growth and development and the control of dental caries.

After making examinations and study models for five years, of the mouths of children ranging in age from five to sixteen years, I am convinced that some practical form of prevention of malocclusion will have to be worked out. If the forces utilized in building perfect occlusion of the teeth are interfered with, we shall not have the facial outline nature intended.

In making a diagnosis of children's mouths, study models should be made and x-ray pictures should be taken yearly, beginning at the age of four. In this way one can check the child's habits and note any tendency to arch constriction due to mouth-breathing, finger-sucking, or other malforming traits. One can also note the congenitally missing teeth. To prevent the collapse of a normal arch one must maintain the mesiodistal width of the deciduous molars. In the event of the loss of one or more of these deciduous, or so-called baby, teeth this space should be maintained with a suitable appliance.

If you are at all in doubt as to the possibilities of acquired malocclusion resulting from extractions, make a few study models and notice the drifting of the first permanent molars. It is surprising to note the drifting of these teeth even in case of distal cavities in the deciduous second molars. The loss of this space may result in the impaction of one or more of the premolars. If eruption does follow, either inside or outside the arch, the peculiar proximal contacts will invite incipient caries.

The next most important step to observe is the premature loss of the deciduous canines. With the early loss of these teeth the arch contracts so there is insufficient room for the permanent canines, and they in turn become impacted or erupt outside the arch, presenting a picture of prominent canines commonly referred to as buck teeth. Very few parents realize these conditions until the damage is done. Corrective treatment for these mouths requires two to three years' time.

Brandhorst in the July, 1932, issue of the *J. A. D. A.* showed that the premature loss of deciduous teeth is responsible for 37 per cent of dentofacial deformities. Is this not a challenge to us to gain a better understanding of exposed and pulpless deciduous teeth that we may eliminate these deformities

without the use of appliances and the unnecessary expenditure of money? Dr. George Moore, head of the orthodontic department at the University of Michigan, says, "Prolonged orthodontic treatment is necessarily time consuming and costly to the point of being prohibitive. Conscientious orthodontists deplore this fact and welcome any opportunity that may be extended to them to further practical plans for prevention and to disseminate the knowledge relative thereto."

We cannot expect cooperation from parents unless they understand the danger of their children's acquiring malocclusion from the loss of deciduous teeth. Most parents believe, as their grandparents did, that Nature in her goodness to us gave us two sets of teeth, so why bother about the first set when another set will come along. Nature does give us a second set, but when the first teeth have not been kept in place to provide space for the successors, Nature does not do such a good job in lining them up in the arch.

For more than twenty centuries man has sought to learn what causes decay of human teeth. It seems that every theory which has the slightest plausibility has been advanced and has had its believers, sometimes for hundreds of years. For two thousand years it was believed that the stagnation of juices within the teeth caused decay. The belief that decay arises from disturbances of nutrition has been held by some since the time of Galen, A.D. 131. For many centuries worms were believed to be an essential factor in the origin of decay, and this belief is said to be still current among the lower classes in some countries. The theory that decay of the teeth is an inflammatory process had its first faint beginning with Abbot and Bodecker in 1884. The book in which that defense appeared was indorsed as a textbook by the National Association of Dental Examiners. Other theories have ascribed the origin of decay to putrefaction, chemical dissolution, electrolitical dissolution, parasites, and imperfections or weaknesses of the tooth structure.

Much has been written and much is being written on the subject of dental caries. Colleges and many private groups are making this study, but I have been unable to find any authority who will take the responsibility that its method of treatment will prevent dental caries. There is no doubt that mouth hygiene and general health have an important bearing on the control of caries. On the other hand, we have all observed the mouths of many children who have had the best of dental care both at home and in the dental office but whose teeth present rampant decay.

Brown and Tisdall of Toronto make the assertion that during the past twenty years numerous surveys have indicated that approximately 95 per cent of children suffer from this disease. At the present time there is probably no other disease to which the human body is so subject, that is so widespread or so fraught with potential danger to the health of the individual.

There is of course a marked diversity of opinion as to what is the cause of experimental caries. A lack of various vitamins, excess of vitamin D, a deficient supply of the minerals calcium and phosphorus, and the consistency of the food have all been considered etiologic factors in the development of this disease.

It is realized that the value of this work lies in its application to man. Accordingly, a total of approximately 350 children on diets containing varying amounts of calcium, phosphorus, and vitamin D, have been observed during the past year in four institutions, with the aid of a group of dentists in Toronto. A meticulous examination was carried out at the beginning of the investigation and will be repeated at its conclusion. During the period of the investigation the children were divided into three groups as follows:

(A) Control group, in which no change has been made in the diets.
(B) A group which has been given additional vitamin D.
(C) A group which has been given additional vitamin D and phosphorus.

An interim examination has recently been made of the children in Groups A and B. To insure an unbiased interpretation of the results, operators in examining the children were unaware of the groups into which the children were classified until all the records were completed. This examination showed in those children who had been given additional vitamin D, a definite trend toward a lessened incidence of caries as compared with those who had eaten only the usual normal diet. Moreover, the children with added vitamin D showed that previously existing cavities had been largely arrested. In certain of these cases a definite hardening of the cavity walls was apparent.

The findings of the Michigan Group on Dental Caries, as reported in the April, 1934, issue of the *Journal of Dental Research,* in an article entitled, "Bacteriological, Chemical and Nutritional Studies of Dental Caries by the Michigan Research Group," may be summarized as follows:

"1. No consistent correlation could be found between amounts of the salivary total solids, ash, Ca, P, Cl, diastatic activity, pH, CO_2, Ca capacity, or total alkalinity, and activity of dental caries.

"2. No relationship could be found between the intake of Ca, P, and vitamin, or acid-base dietary values, and activity of dental caries.

"3. Evidence is submitted indicating that sugar is a very important consideration in dental caries.

"4. A remarkably low degree of dental caries was observed in children on a low sugar diet deficient in Ca, P, and vitamin D.

"5. By increasing the sugar intake, active dental caries was induced in children while they were receiving a diet that was nutritionally adequate.

"6. Ingestion of low sugar diets was conducive to freedom from dental caries in a majority of individuals.

"7. The most constant differential between caries-free and caries-susceptible individuals is that of relative number of *Bacillus acidophilus* organisms in the mouth. This correlation was approximately 90 per cent positive.

"8. There is a possible immunologic factor antagonistic to *B. acidophilus* in the blood of caries-free individuals, in whose mouths, as a rule, *B. acidophilus* does not exist; and when planted therein promptly disappear.

"9. The possibility of increasing immunity against *B. acidophilus* in caries-susceptible individuals by vaccine therapy is suggested.

"10. Inherited tendencies or inherent individual characteristics were, in a small percentage of cases, more important determinant factors in caries susceptibility than ordinary conditions. A great majority of caries-susceptible individuals, however, can apparently be benefited by simple dietary measures."

I am very much indebted to the Hon. Daniel J. Healy and Dr. James Sinnott for the privilege of making a series of observations in the Wayne County Detention Home. Whether it be true generally I cannot say, but in this institution I found that high calcium and low phosphorus index meant dental caries. Clinical examinations bore out the hypothesis.

In my own practice I have made examinations of children beginning at eight years of age. I have observed children of fourteen years with no dental caries whose product of calcium and phosphorus was forty or above.

The index of a girl patient sixteen years old, with proximal caries in all premolars, was calcium 14, phosphorus 3.5.

A boy twenty-two years old with rampant caries in all his teeth and suffering from infectious arthritis had an index of calcium 8.5, phosphorus 3.

Furthermore, I have observed a number of children ranging from eleven to sixteen years of age, with all posterior teeth lost through dental caries, with calcium index from 10.2 to 13.2.

By a supplementary diet of chlorophyll and essential minerals I have noticed a lowering of high calcium index and a raising of a low phosphorus.

Many have perhaps noticed in mouths of patients, particularly in girls, between the ages of fourteen to seventeen years, proximal cavities in one or more of the premolars. It is evident that these teeth at this time did not have sufficient resistance to carry them through the period of adolescence. In the same way, when one sees three-year-old children with caries, who since birth have had every advantage, one begins to wonder whether prenatal influences do not have a much greater bearing on tooth structures than is commonly supposed.

The available data relative to caries include the following: that dental caries under certain conditions can be controlled; that caries is more rampant during the winter months, being most severe in the time of reduction of vitamins in the foods and periods of rapid growth. Briefly, the control of caries, so far as we know now, is as follows: calcium and phosphorus content of the blood in balance, low bacteria count in the mouth, correct diet including a reduced intake of carbohydrates and sugar, and frequent dental attention in the office augmented by rigid care in the home.

The small defects reduce the cost, make operations less severe for the little patients, and minimize the danger of tooth abscess.

LOW FUSING METAL INLAYS FOR FILLINGS FOR DECIDUOUS TEETH

RALPH L. IRELAND, B.Sc., D.D.S., LINCOLN, NEB.

FILLING materials commonly used for deciduous teeth are silver amalgam, copper amalgam, cement, gold, and porcelain. Of these, silver amalgam and copper amalgam are probably used more frequently than the others. Both silver and copper amalgam have their advocates, and each claims equal advantages for his particular selection. Silver and copper amalgam, as well as gold, porcelain, and cement, have their uses, and when correctly employed in the proper places are excellent materials.

I am convinced, however, that low fusing metal as a filling for deciduous teeth possesses several advantageous qualifications not to be found in the aforementioned materials. Furthermore the technic and procedure involved are as feasible for the general practitioner as for the specialist.

Perhaps the most important qualification disclosed thus far is the durability of low fusing metal. Laboratory tests made on a selected sample demonstrate that it will withstand the masticating stress of the average child. For example, a class one cavity was prepared in an extracted molar tooth, and a low fusing metal inlay inserted. The filling, measuring 1.4 mm. in thickness, was struck 10,000 times with an automatic plugger, set to deliver the maximum blow, at various points on its surface and at different angles. Notwithstanding the fact that serrated as well as smooth points were used, the margins of the filling were still in perfect condition after the malleting. A three-quarter crown, the incisal surface of which measured 1.4 mm. in thickness, was also made of low fusing metal and placed on an extracted central incisor. After subjecting this incisal surface to 5,000 strokes of an automatic plugger equipped with a serrated point, the margins were still unblemished. Owing to the malleability of the metal, the thickness of the incisal surface was reduced 0.1 mm.

The results of low fusing metal utilized in practice have also been gratifying. Fillings which have been placed in the mouths of children ranging from four to nine years of age are in excellent condition at the present writing. It has been noticed that in the mouth the fillings tarnish slightly, but no more than do silver amalgam fillings. To provide more exact data laboratory tests are now in process to determine the chemical action of saliva on the metal under discussion.

The material employed in the foregoing experiments is Dee's low fusing metal H. This metal, with a melting point of 170° F., has a crushing strength of 10,250 pounds per square inch, which should be ample for deciduous fillings. Its thermal conductivity is low. Compared with gold with a conductivity of 0.700, and silver with that of 1.000, its thermal conductivity is only 0.100. Obviously such a low thermal conductivity is much to be desired in a filling material, especially for use in deciduous teeth.

TECHNIC

The technic for making low fusing metal inlays is simple, is easily mastered, and demands no special equipment. In addition, only a little more time is required to make one of these inlays than is needed to insert a silver amalgam filling, twenty to twenty-five minutes being ample for the procedure.

A suitable copper band is selected, trimmed, and fitted to the tooth. Contact point is marked with a sharp instrument, and a small hole is made in the band at this point (Fig. 1).

A modeling compound impression of the prepared tooth is taken, removed, and the excess compound is trimmed away from the band with a sharp instrument (Fig. 2).

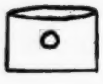

Fig. 1.

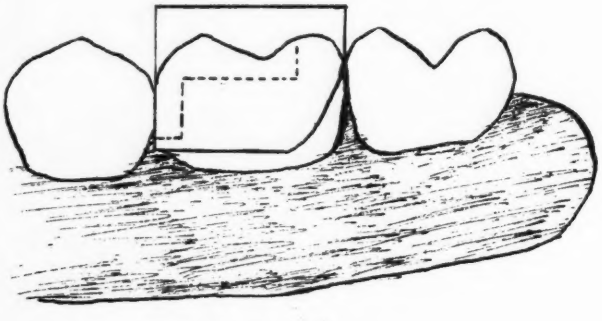

Fig. 2.

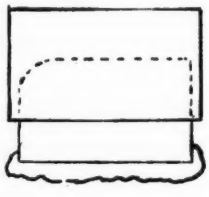

Fig. 3.

A strip of base plate wax is then adapted around the upper part of the band and sealed to the band with a hot spatula. The wax should be of a width sufficient to extend about one-fourth inch above the band, thus allowing for an adequate base of plaster (Fig. 3).

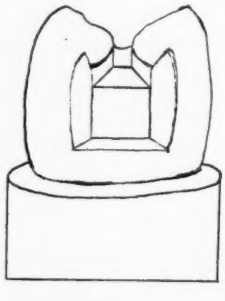

Fig. 4.

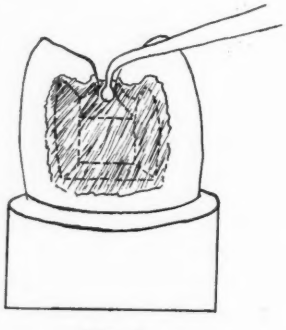

Fig. 5.

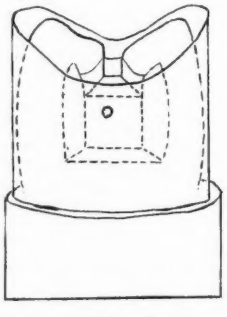

Fig. 6.

With a sharp wax spatula or knife, a small amount of wax is trimmed away from the inside of the base plate wax ring down to the copper band. This trimming will establish a ledge on the model at a point just below the crown, the necessity for which will be seen later.

A mix of good quality impression plaster is now made and vibrated into the impression. When the plaster has set, the modeling compound is softened in hot water and removed. In removing the band, care should be taken not to bend or distort it. The result is a model similar to the one illustrated in Fig. 4. Note the small ledge running around the model just below the crown.

A piece of No. 10 tin foil is next burnished into the cavity to form a tin foil matrix, which is allowed to extend beyond the outside walls of the cavity (Fig. 5).

The same copper band used in taking the impression is now placed on the model and trimmed to the level of its occlusal surface (Fig. 6). The band will fit the ledge previously established. This ledge provides a definite seating place for the band, keeps the band from slipping off the model, and helps to prevent the molten metal from running through when poured into the mold. After the band has been trimmed and is in place on the model, the metal can be stopped from flowing into spaces where it is not desired by packing moldine or artist's clay in and around all such areas. If this precaution is taken, the later polishing process will be expedited.

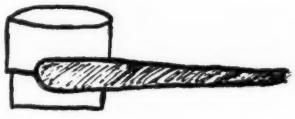

Fig. 7.

The foregoing preparation completed, the low fusing metal is placed in a small pan and melted over a flame. The pan, as well as all instruments employed, should be thoroughly cleaned before using.

The model with the copper band in place is now grasped with a pair of wire crown pliers so that one-half of the surface of the beaks engages the band and the other half the plaster model (Fig. 7). If the fingers and thumb are placed through the openings in the handle of the pliers from the under side and pres-

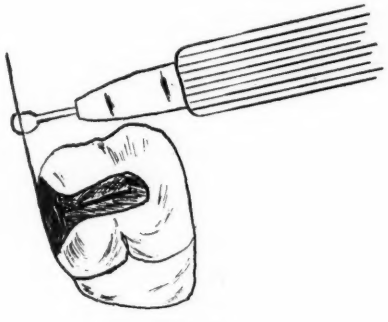

Fig. 8.

sure exerted outward, a firmer hold upon the model may be obtained. Holding the model with the pliers in the left hand, the molten metal may be poured into the mold directly from the pan and vibrated into position. This method is recommended for larger restorations such as mesioclusodistal or three-quarter crowns. In smaller cavities, such as class one, two, or five, the metal may be dipped from the pan by means of a small spoon-shaped instrument. In this way a greater control may be exerted over the amount of metal poured into the mold. The metal will harden in approximately two or three minutes.

The metal having hardened, the copper band is cut with a Joe Dandy disc and removed. The inlay is then polished with sandpaper discs and rubber

polishing wheels (Fig. 8). The occlusal surface can be carved with various sizes of round burs.

The inlay is now removed from the model, placed in the tooth, and tested for contact and high spots. If the contact is shy or a margin faulty, the inlay is removed and placed on the model. More metal can then be added with a hot beaver-tail burnisher, and the whole repolished. High spots can be ground down with round burs. The inlay is now ready to be cemented into the tooth, for which process a germicidal cement is used.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Almost any type of cavity can be filled with the low fusing metal inlay. Figs. 9, 10, 11, and 12, however, illustrate the various types for which it is best suited. I believe that this method will be especially useful for maxillary central incisors when the angle of the crown has been fractured. Experiments are now being conducted with regard to this problem.

This article represents merely the initial steps in an investigation of the possibilities of low fusing metal. It is my hope that findings on additional uses for this material may be submitted in the near future.

SOCIETY'S SUBMERGED EIGHTY PER CENT MUST GET HEALTH CARE

EUGENE ANDERSON

AMERICAN dentists have made oral hygiene the world's greatest health science, since it has been found that 70 per cent of all bodily ailments are caused by mouth and throat conditions. The world sends its dental students to American dental colleges, because dental science in America leads that of the world. America, however, is behind all other great nations in social security programs, although this country has not been entirely negligent.

Eighty per cent of the people of America are so poorly paid for their services that they cannot buy medicine or medical service or dental or surgical service. A large percentage of every industrialized country's citizens is too poor to buy such service if the people buy enough to eat in order to insure good health.

Fraternities, societies for insurance, burial societies, poor farms, hospitals, public health departments, sewerage, sanitary departments, clinics, free or charity practice, city physicians, state medical departments, trained nurses, Red Cross service, medical clubs for paneling patients and doctors, group insurance by which stores and business and industrial organizations protect the families of employes in case of illness or death, health and accident insurance, state control of injury and accident compensation—these and many other forms of socialized control of health conditions have already developed in America. And the end is not yet.

Three influential American dentists, representing different branches of dentistry, met recently to face the future. Before them were reports from investigations that have been made in many of the European countries in which social security laws have operated for years. They freely admitted that doctors, dentists, surgeons, and nurses must give their services to people who cannot pay, but they were disturbed over the thought that laymen should be allowed to control the professional services or should administer clinics and health service.

They were also displeased with the money-making plans and policies that insurance companies would create for selfish ends. They foresaw that these companies would be eager for health insurance and for professional services to be under their control. This would mean a cheaper grade of service. It would mean, according to the conferees, that research work and advances in science would stop; that, as in Russia, doctors and laborers would be classed somewhat alike, and that the only way the professional men could hope for commensurate income would be through such unseemly conduct as laborers have to resort to when they go on strike to obtain justice. It was pointed out that in Russia

physicians only recently were below engineers and other overall workers and were paid less, but during the past six months increases in pay have been granted to the professional men of that Soviet country. In America the professional men must not sit idly by and see the politicians put them in the plight that characterized Russia for so many years.

"We believe in socializing our services so as to make them available for the 80 per cent of the underpaid population," said one of the spokesmen at the meeting, "but we want to say by whom our services shall be controlled and directed. We have never withheld our services when people were too poor to pay us, and we work gladly at the free clinics in the hospitals, but we do not want to see the insurance companies get the thing sewed up so we will have no influence or power except through the methods used in other countries. If politicians think they can get the votes of the 80 per cent of the underpaid population by promising insurance schemes, they will, through the aid of insurance lobbies, put us in a plight.

"The cheapest men will have the advantage. The premium will always thereafter be placed on cheapness, and we shall lose much that we have gained in our scientific research. One dentist of the higher type these days will spend more time and do more work in his laboratory and will spend more on attending summer schools, etc., than the insurance companies are willing to pay for the entire time of such a man. The question will be, not how well can you do a job, but how quickly and how cheaply."

The dentists and the physicians are well represented by committees in Washington. They are there to watch Congress. They know the President's interest in the 80 per cent of the underpaid population, and they understand how easy it is to mislead those people. They are made to believe that the free health service is the ideal thing for them, and the professional men in opposing some features of the set-up are not fighting on the popular side of the question.

With the abuses that have grown up under the systems as heretofore tried, the professional men are fortified with arguments. They know how important it will be to have laws that will discourage malingering, feigning illness, actual ill feelings, and consequent ill health. They know that a premium is put on the will to be sick rather than on the will to get well. They know that morbid states are thus created which should be avoided.

In other words, they are accustomed to see their patients eager to get well because it is expensive to be sick. They are afraid of the condition which reverses this. They know it is not best for people to find it easier and more profitable to be sick than to stay well and keep at work.

Dentists count themselves an inseparable part of the health-preserving forces of this country, and their right to such claim is freely admitted by physicians. At one time, even in recent years, the profession of dentistry required little schooling, and dentists did not aspire to a part of the great medical science. They plugged teeth, pulled teeth, made artificial teeth, and that was thought to be all. Some men, however, realized that through the mouth most disease enters the system; therefore oral hygiene became the most important of all health sciences. Then dentists began to get a medical education first and a dental edu-

cation second, and they became specialists in some one or other branch of dentistry. They are proud of what they have contributed to health and comfort in America. They foresee in the present agitation a threat to their continued advancement. They now hold the first place in the world's esteem and they do not want to slip back.

They are joining with the physicians in demanding that in whatever is done for the people who are too poor to pay for private treatment those people must not be used as a pawn by scheming politicians.

AMALGAM

STEVE A. GARRETT, D.D.S., ATLANTA, GA.

ACCORDING to Black, "Amalgam is a composition of mercury with another metal, or mercury with an alloy composed of two or more metals, which is made at ordinary temperature by rubbing the mercury with finely divided particles of the metal or alloy."

HISTORY

For many years amalgam has been known to chemists and has had a limited use in the arts. As a filling material for teeth it appears to have been used early in the last century, or perhaps earlier. Apparently it was first employed by the charlatan.

In about 1839 it began to be used rather considerably by the itinerant dentists, that is, the men who wandered from town to town, with no definite place of abode. It is largely from the stories of these men that the history of its use in dentistry is derived. The first amalgam was made by filing a silver coin and rubbing the particles together with mercury. This high content silver alloy was very difficult to manipulate. It took so long to harden and set that doubtless most of the fillings were mashed or chewed out before the mass became firm. I myself have seen one or two rough looking old fillings that the patient claimed were made by that method.

Many good men refused to use it and regarded those who did as quacks. A few of the better men, however, saw some merit in the composition and began to study and experiment with it.

Affinity of mercury with tin led to an attempt to alloy the silver with tin. This made a much more easily managed product. The manufacturers soon produced an alloy composed of these two metals. It is true, however, that it was many years before anything like the present high grade alloys began to be dreamed of or considered. Much of the final perfecting was done in Germany, England, and France.

The great trouble was that no sooner had the contraction of the mass and the prevention of its shrinking away from the margins been overcome, than it was found that the mass was furiously expanding. Many teeth were split asunder by this quality, according to various authorities.

I believe, however, that it is safe to say that for the past half century more teeth have been filled and saved with amalgam than with all other filling materials combined.

INDICATIONS

Amalgam is indicated in all teeth except the six anterior teeth, maxillary and mandibular; in anterior teeth the color of amalgam is objectionable. I have often, however, seen it doing wonderful service where it was not supposed to be

used. Especially I have observed it on the distal surface of the maxillary canines and the cervical surface of the mandibular canines where for economic reasons no other material was advisable. Many inlays have been saved and restored to years of usefulness by a small amalgam patch carefully placed in the break.

It is also useful sometimes around the palatal surface of the maxillary incisors. A highly polished amalgam will irritate the gum as little as any other type of filling and requires less effort on the part of the dentist. If a cement base is used, there will be but little objection and discoloration.

CONTRAINDICATIONS

Its use in the anterior teeth is contraindicated, and also, in my judgment, in cases where most of the crown of the tooth is lost. Many men are using it for full crown restorations and are doing beautiful work and a wonderful service. I believe that these large masses are very difficult to control, and that in most hands successful manipulation is too difficult. The edge strength is somewhat lacking, and I believe that a cast restoration probably is usually superior. Amalgam, however, should be carefully considered from an economic standpoint and also from the standpoints of labor, material, and physical effort.

In all other types of cavities its use is indicated. I do believe, however, that as a general rule in a three-surface cavity—a mesioclusodistal—if two fillings are utilized, the cavity can be more correctly and easily filled. By two fillings I mean first to make a distoclusal filling and at another sitting a mesioclusal filling.

In order to insert amalgam it is always necessary to have four walls. In any type of cavity other than Class I, or simple one-surface cavities, a matrix must be used to supply the fourth wall. In distoclusal or mesioclusal cavities the half round matrix properly wedged is the one of choice. A flat surface toothpick or an orange wood stick trimmed or a little celluloid wedge may be used to adapt the matrix more closely at the cervical margin.

Some men prefer an all-round matrix, but it is my practice to use a close-fitting copper band properly festooned if I cannot employ the half-round appliance. A hole is punched at the contact point and the filling adjusted for height. At the next sitting the band is slit and removed. With stones, etc., the restoration is finished, polished, and grooved.

INSTRUMENTS

Too many instruments are a menace. Select a few double-ended pluggers and a few plastic instruments. Adapt them to your hands; perfect your motions with them, and make them do what you want.

I do not believe that any amalgam can be properly mixed by adding a little more alloy at each mix. Particularly is this true if an assistant is doing the mixing. Some type of mechanical proportioner is definitely indicated. One that you can adjust to your own ideas will be very helpful.

Too much mercury makes a weak filling; too little mercury makes the mass difficult to manipulate and more difficult to adapt. The mechanical device eliminates most of such trouble.

After the amalgam is triturated in the mortar, it should be worked in the palm of a dry clean hand. It is even better, however, to use a square piece of rubber dam. A good rule to follow for the correct amount of mercury is that when the amalgam is annealed in the hand and takes an imprint of the skin the proportion is correct.

CEMENT BASES

No metal filling should be placed in a cavity of any great size without a base; the thermal shock is too severe. A cavity lining should be placed first. I rarely ever insert an amalgam filling alone. Instead it is my custom to place a cement base in all of them. After the matrix is in place, a fairly stiff mix of cement is placed in the deepest portion and worked almost to the margins. After the amalgam is well started, it is time to see that it does not run over the margins. There is ample time to work the amalgam, so do not feel the necessity to hurry. Chisel off any cement that covers a margin and leave sufficient amalgam for strength.

A small pellet of soft amalgam is then placed and with a small instrument is shoved down into the cement. This gives further retention, and many times this extra amount is needed. The cement base in addition to helping to retain the filling also strengthens the tooth, as it has cohesive properties with it. The amalgam is then added and tamped—always in small pieces.

After the first soft pellet or two covers the cement and grips into it, stiffer amalgam is added. Always work toward the margins, removing the excess mercury as you go. The last pieces, of course, should be as dry as you can safely work them.

When the cavity is overfilled, do just as much burnishing as possible. This gives an excellent margin and a smoother finish; therefore there will be less polishing to do later.

The matrix is removed at once, and a small strip of stretched rubber dam is slid between the filling and the adjoining teeth. This polishes the interproximal space, all that can safely be done without interfering with the contact point.

It is my plan to use just as much cement as possible. In other words, I want a cement filling with somewhat of a covering of amalgam—not, of course, a veneer in the strictest sense, but a cement filling extending nearly to the margin covering all the floor of the cavity, with amalgam driven down into it and incorporated with it, somewhat as a pile is driven into a soft foundation.

When these fillings give way at the margins—as sometimes they do—decay does not seem to progress so rapidly as in other types of fillings; therefore repair is frequently a very easy matter—just a small filling to the cement base.

While the filling is soft, considerable effort is made to carve out the general tooth form. It should, however, be polished and carved at a subsequent visit. Sandpaper disks of coarser, then finer grades, burlew disks, etc., are used for polishing and finishing.

A dull round bur should be used to finish the occlusal edge, to run out the grooves, to magnify the marginal ridges, etc. It is run backward and forward—always toward the margin. This gives a burnished appearance and, I believe,

somewhat of a hardened surface on the metal. The contact point is then tested. I attempt to place it about as close as the other teeth in that particular mouth. If an overhang occurs, now is the time to find it. My experience with chiseling or filing it off has not been very successful. Sometimes a very thin finishing file will remove it. The surest way, however, is to place a new filling. Take an x-ray picture if necessary to find out how it looks at the gingival surface.

CARE OF AMALGAM

At every prophylaxis each amalgam should be subjected to polishing again. It does not have to be done vigorously, but slight abrasives should be used each time. Not only does this keep the fillings looking better, but also they are cleaner. It will also help in finding any margins that are breaking down.

My contention is that this type of filling is practicable for the average practitioner—that it will give reasonable service, that it will be clean, that it can be easily repaired, that it is obtainable by and for the masses, and that to the dentist it is economically sound.

Dr. Gordon Tyson of Gainesville, Florida, has been very generous with his time and suggestions in smoothing out many of the difficulties I have encountered in working with amalgam, and I wish here to pay tribute to him and to his skill.

TEETH THE ANIMAL WAY*

H. Shirley Dwyer, D.D.S., Brooklyn, N. Y.

DID you ever hear of Noah and his Ark? Sure you did. Why I used to hear an old colored nurse sing about how "Noah built de Ark and filled it full of animals." We all remember how it is said that the animals came into the Ark *two at a time.*

Can't you just picture them scampering up the gangplank—first a pair of rabbits; then a couple of baby elephants—maybe chased by the dogs; and then at last the great big old elephants plodding and crushing their way along?

Funny, now that I think of it, but you know that is just the way we get our teeth, too.

First the little front, cutting or incising teeth . . . like the rabbits. In fact those little front teeth are very much the same as bunny's. A rabbit, you see, has so much nibbling to do. He has to cut off his celery stalks and lettuce leaves and all the other green vegetables—just as you and I *should*—and so Nature has provided him with very special front teeth that work like a pair of scissors—the same as yours and mine. That is why those front teeth are called *incisors,* because they incise or scissor. All teeth are not alike. They are quite different, and there is a tooth for every job, and the job of our incisors is to cut up our food before it is sent back for the other teeth to work on. The incisor teeth are the first teeth that baby gets—like the rabbits in the Ark, they are the first pair to come aboard, and are right in the front of baby's mouth, usually first appearing in the lower jaw. The teeth come in pairs—the central and lateral incisors—between the fifth and tenth months of baby's life, and are followed by the first of the baby molars . . . the baby elephants that we saw strolling up our Noah's Ark gangplank.

Certainly these baby molars do remind us of the baby elephants. They have that same broad, flat, heavy look that elephants have—even baby ones.

Then, too, elephants do have molar or grinder teeth, and have you any idea of how big an elephant's tooth is? You would never guess. An elephant's tooth is as big as a loaf of bread. Just think how small that peanut must feel when the elephant starts grinding away with those big loaf-of-bread teeth, crushing up that little peanut or smashing down a few whisps of hay just the way the old millstones used to crush up the rye or wheat grains to make us flour. The millstone is big and flat, and has ribs on it to help in the grinding process. That is just like the big molar or grinder teeth that our friend the elephant has—and that we have too. In fact, that is why the big back grinding teeth are called molars. It is not difficult to think of millstones and say "millers," and it is certainly very easy to change "miller" into "molar," and presto—there you are. Now you know the names of your grinding

*A radio talk.

teeth, the molars. That is exactly what they are and do. They crush and grind up our food. The little *scissor* teeth—what are they? They are the incisors. They have cut up the food that the molars are now grinding to a pulp so that it will be easy to swallow; and they are the baby teeth which come next into the child's mouth. Oh, when he is somewhere around a year old.

Great spoons, but we have been so busy talking about teeth that we forgot all about poor Noah and his Ark. Well, the baby elephants are on board and here come the dogs close after them. I think, judging from their long pointed noses, these must be collie dogs. At any rate, whether they are collies or poodles, greyhounds or dachshunds, they are all known to scientists by their latin name —canine, which means dog.

Of course, a dog eats mostly meat, and so the characteristic tooth is a sharp, pointed one—like the collie's nose—that is meant to tear apart the tough fibers of raw meat. We have teeth like that too. Long, sharply pointed teeth for tearing apart our meat, and because they are so much like the dog's tooth, they are called by his name—canine. They arrive in a child's mouth close after the first of his baby molars.

Well, have you guessed it by now? Of course you have. Our Noah's Ark was baby's mouth, and now we have it in the three kinds of teeth—cutting, tearing, and grinding teeth—incisors, canines, and molars. If you should look into little Johnny's mouth when he is between two and three years old, you would find twenty little teeth—ten upstairs and ten down—five on each side of his mouth. Starting with the middle and going back they would be the incisors, canines, and the back grinders, called the molars.

I said before that there is a tooth for every job—cutting, tearing, or grinding. Now I add to that and say that there is also a job for every tooth. How many of us have ever considered that part of it, I wonder. We quite often have a lot of trouble *getting* our teeth, and some of us have a worse job *keeping* them, but do we make them work for us as they should, and do we treat them right?

Since we have all three kinds of teeth, we should eat foods which will use all of them. Green leafy vegetables, such as celery, cabbage, lettuce, etc., give not only our incisors, but also our molar teeth something to work on. A small amount of meat gives plenty of exercise to our doglike friend, the canine, and is good for us too. Maybe some hard crusts of bread or ry-krisp can be eaten to keep our molars from feeling slighted. Of course, we drink milk, but that is part of treating our teeth right, along with cleaning them. If our teeth are really going to work for us as they should, the very least that we can do is keep them well nourished, clean, and free from decay.

There now. All this time I have been talking about the *baby* teeth, and there are those two great big old elephants still waiting to get on the Ark. Well, they will just have to wait for a while, that's all. They are our first permanent molars and are not supposed to come on board until we are around five or six years old—that is why they are so often called the sixth year molars. They are mighty important, but these baby teeth certainly deserve all the time that we have given them. What, you do not know why the baby teeth are important? Say, where have you been all these years since you lost your baby

teeth? Remember that toothache you had in a baby tooth? It kept you awake and mother awake, in fact the whole blamed family awake. It was important then, wasn't it?

I just said the whole *blamed* family, and that is exactly what I meant—*blamed*—because the family was to blame. Please do not forget that baby teeth are important, they are all that the child has to chew with for a long time; they can ache just as hard as a permanent tooth; and if properly cared for they will serve as guides to make the permanent teeth come into the mouth straight.

Here come the elephants! They have been hanging around that gangplank for the past six years, so we better let them in. Besides they are very important. Of course, by now you know who they are—the first permanent or six year molars. Just as these big old elephants have not taken the place of any of the other animals in the Ark, so the big six year molars do not take the place of any of the other teeth in the mouth. Do not forget, Mother, that the first permanent molar, or sixth year molar if you wish to call it that, comes into the mouth *behind* all the baby teeth, and does not take the place of any other tooth. It is really quite easy to remember, because when baby is six years old you should be able to count back, starting at the center (the incisors, of course) until you come to number six. When you reach number six, look at it very carefully, for that is a permanent tooth, and baby will never get one to take its place. Take the very best care you can of that tooth. Keep it clean, and keep it whole. Do not let the slightest crack or crevice mar its surface. Get your dentist to examine it carefully when he examines all the rest of your child's teeth to be sure there are no flaws or pits in it, and always remember that there is never a hole in a tooth which is too small to fill. Any one who tells you that a hole in a tooth is too small to be taken care of is either woefully ignorant or willfully negligent.

Now the Ark is about to sail, and so am I; so, until we meet again—Good teeth and good health.

Department of Orthodontic Abstracts and Reviews

Edited by
DR. EGON NEUSTADT AND DR. JOSEPH D. EBY, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. Egon Neustadt, 133 East Fifty-Eighth Street, New York City.

Fundamental Principles of Orthodontia by Dr. Rudolf Rehák. Review of the Hungarian textbook on orthodontia, "Az Orthodontia Alapvonalai," 1934, Budapest, Pfeifer Ferdinand.

The first volume of this book deals with problems which are of considerable interest to the general practitioner and to the physician who in the course of his work has to deal with children. The real title of Rehák's book might be: What can a dentist and physician do to prevent irregularities of the teeth? The author believes that the general practitioner and the physician can do much more than we expect.

In his introduction the author defines the meaning of the term orthodontia and gives a short summary of its problems. The old school endeavored to correct the malposition of teeth, but Angle defined his aim in treatment as the accomplishment of normal occlusion. He even believed that only normal occlusion could assure the harmony of the face. P. W. Simon and others recognized the errors of this conclusion and considered the ideal aim of treatment to establish the biometrical norm. The chapters on anthropology and anatomy deal in a clear and comprehensive manner with the structures of the maxilla, the mandible, with the masticatory function, the muscles of expression, and the soft parts of the mouth region. The description of the structural changes taking place in the periodontal membrane and in the periosteum (Oppenheim) during correction merit special mention.

In the chapter on etiology the endogenous or exogenous causes responsible for the anomalies of the teeth and jaws are discussed. The problems of heredity, beginning with Mendel's finding, are extensively described, and also the mechanism of sucking, the bad consequences of bottle feeding, and the improved method of feeding with Dreyfus's Poupon nipple. The anomalies caused by faulty sleeping positions are demonstrated by means of teleoroentgenograms made after the author's own method.

The chapters on prophylaxis and early treatment deal with the possibilities of preventive efforts in the struggle against rickets, and with the employment of Roger's exercises.

The chapter on diagnosis contains the description of the earliest systems of diagnosis, the diagnostic system of Angle, and the systems after Angle, including that of P. W. Simon, which is based upon cephalometry. It gives a description of his new gnathostatic and photostatic method. Furthermore, the author includes a detailed description of his own new teleoroentgen method,

employed and developed with the help of B. Simon. This method is applicable to roentgen machines of smaller capacity, so that it can be carried out with advantage in the every day practice. Several fine teleoroentgenograms made with this method are illustrated.

The chapter on "The Plan of Treatment and When to Start It" offers some interesting suggestions. The author believes that the beginning of treatment is independent of the patient's age and depends upon local conditions.

The chapter on treatment, which forms the second part of the book, is illustrated with cases from the author's own practice. The book has an appendix by B. Simon, containing such information on the subject of orthodontia as the general dental practitioner and the pediatrician may find useful. A table of literature completes this interesting book.

Andreas Biró.

Development and Calcification of the Human Deciduous and Permanent Dentition. By Rudolf Kronfeld, The Burr, March, 1935.

The article is a summary of the histologic and roentgenographic findings of W. H. G. Logan and R. Kronfeld. On the basis of new and exact investigations, the authors have been able to revise the old data on tooth calcification which dated far back in the history of dentistry (Legros and Magitot, 1873; Black, 1883; Pierce, 1884).

As these old tables, which are inaccurate and differ considerably on some fundamental data, are still published in recent textbooks, it is advisable to reproduce the new and improved table for the benefit of those men who check up the progress of tooth calcification in their x-ray pictures. It may be added

CHRONOLOGY OF THE HUMAN DENTITION

(Logan and Kronfeld)

TOOTH			FIRST EVIDENCE OF CALCIFICATION	CROWN COMPLETED	ERUPTION	ROOT COMPLETED
Deciduous dentition		Central incisor	5 mo. in utero	4 mo.	6- 8 mo.	1½- 2 yr.
		Lateral incisor	5 mo. in utero	5 mo.	8-10 mo.	1½- 2 yr.
		Cuspid	6 mo. in utero	9 mo.	16-20 mo.	2½- 3 yr.
		First molar	5 mo. in utero	6 mo.	12-16 mo.	2 - 2½ yr.
		Second molar	6 mo. in utero	10 -12 mo.	20-30 mo.	3 yr.
Permanent dentition	*Upper jaw*	Central incisor	3 -4 mo.	4 - 5 yr.	7- 8 yr.	10 yr.
		Lateral incisor	1 yr.	4 - 5 yr.	8- 9 yr.	11 yr.
		Cuspid	4 -5 mo.	6 - 7 yr.	11-12 yr.	13 -15 yr.
		First bicuspid	1½-1¾ yr.	5 - 6 yr.	10-11 yr.	12 -13 yr.
		Second bicuspid	2 -2¼ yr.	6 - 7 yr.	10-12 yr.	12 -14 yr.
		First molar	at birth	2½- 3 yr.	6- 7 yr.	9 -10 yr.
		Second molar	2½-3 yr.	7 - 8 yr.	12-14 yr.	14 -16 yr.
		Third molar	7 -9 yr.	12 -16 yr.	17-30 yr.	18 -25 yr.
	Lower jaw	Central incisor	3 -4 mo.	4 - 5 yr.	6- 7 yr.	9 yr.
		Lateral incisor	3 -4 mo.	4 - 5 yr.	7- 8 yr.	10 yr.
		Cuspid	4 -5 mo.	6 - 7 yr.	10-11 yr.	12 -14 yr.
		First bicuspid	1¾-2 yr.	5 - 6 yr.	10-12 yr.	12 -13 yr.
		Second bicuspid	2¼-2½ yr.	6 - 7 yr.	11-12 yr.	13 -14 yr.
		First molar	at birth	2½- 3 yr.	6- 7 yr.	9 -10 yr.
		Second molar	2½-3 yr.	7 - 8 yr.	12-13 yr.	14 -15 yr.
		Third molar	8 -10 yr.	12 -16 yr.	17-30 yr.	18 -25 yr.

that the first appearance of calcification becomes visible in the roentgenograms only from two to six months after it is evident in histologic sections.

It is interesting to note that "the calcification of the permanent dentition is entirely a postnatal process; at birth no calcification is found in any of the permanent teeth except for an occasional very small amount in first permanent molars."

E. N.

The Forum

Articles for this department should be sent to Dr. Albert H. Ketcham and Dr. William R. Humphrey, 1232 Republic Bldg., Denver, Colo.

Chrome Alloy in Orthodontia. Is It Here to Stay?

There is much discussion of late regarding the use of alloys for orthodontic appliances made of metals other than the so-called precious metals.

An advertisement appearing in *Nation's Business* entitled, "What Makes a Metal Precious?" may aid in answering the question many orthodontists are asking. The advertisement says in part: "How would you describe gold, silver and platinum—the precious metals—apart from their comparative rarity and monetary value? 'Well,' you'd say, 'let me see. Each possesses lustrous natural beauty. Each is highly resistant to all ordinary forms of corrosion, and most chemical forms. Each is readily workable—has the ability to acquire any finish or assume any shape—and I guess that's all.' "

The monetary value of dental golds, since the governmental change in gold policies, has naturally stimulated a great many workers in the field of the so-called nonprecious metals. Chief among these newer metals to be used in the construction of orthodontic appliances is stainless steel, so-called chrome alloy, or chrome nickel alloy. This metal possesses many of the desirable qualities of the precious metals when used as an orthodontic appliance and is more desirable in many ways. The metal is easily workable, possesses edge strength greater than the precious metals, and is highly resistant to all ordinary forms of erosion. It is particularly desirable to use in the mouth as it retains a high polish in the presence of the fluids of the mouth and is low in electric action. The metal possesses great strength, which permits the use of smaller diameter arch wires with increased elasticity.

In using the metal, one must acquire an entirely new technic, as appliances cannot be constructed satisfactorily by simply switching to the new material and trying to adapt it to the old technic. The uniting of the metal should be accomplished principally by electric spot weld; however we have found the use of gold solder in conjunction with welding to be satisfactory in meeting some of the requirements. Many can remember when the change was made from the so-called German silver appliances to gold bands and to iridum platinum bands and arch wires; then later to gold platinum alloy appliances. A similar change is now taking place, and there will be a change in technic to include the use of chrome steel alloys for orthodontic appliances.

To quote further from the commercial advertisement: "Men will never barter their souls or spill blood for it; yet this time-tested stainless steel, with the single exception of intrinsic value, offers more desirable characteristics to the fine-metal worker than do the precious metals themselves. The craftsman asks only that his material be chemically inert, naturally beautiful, strong yet amenable to his artistry; it is the buyer who measures precious metals by price."

W. R. H.

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Editorials

The Pacific Coast Conference

A PIONEER IN ORTHODONTIA AND DENTISTRY FOR CHILDREN

ABOUT twelve years ago a great cooperative movement was started among the dentists on the Pacific Coast. Out of that movement has evolved the Pacific Coast Dental Conference. It is strictly a regional conference, and as all members must be members of the American Dental Association, it is one adjunct to that mother organization.

The first conference was held in Portland, Oregon, in 1926; the second in San Francisco, California, in 1929; the third in Seattle, Washington, in 1932; and the fourth will be held in Long Beach, California, July 8-13, 1935.

This conference will be unique in dental history because of the unusual plan of the program. The central thought is, "Dentistry as a Health Service," and around that theme is developed a progressive, logical unfolding of every phase of dentistry.

As the INTERNATIONAL JOURNAL OF ORTHODONTIA AND DENTISTRY FOR CHILDREN specializes in its published material, the attention of the reader is called to two of the six sections of the conference, namely, Section IV, "Preventive Principles of Dentistry," and Section V, "Orthodontia." In these two sections the very latest in thought and practice will be stressed on orthodontia and dentistry for children. In the group and individual clinics, those dentists following these two lines of practice will be given the very latest and best of research, practical methods, and theory.

Readers of this Journal should take particular advantage of this postgraduate week and should combine it with a vacation at Long Beach, California, this July. Eleven of the outstanding authorities in their field of dentistry are being brought from all over the United States and Canada, and consequently the conference assumes an international aspect.

F. E. H.

Oklahoma Specialists Law

THE first copy of the much discussed Oklahoma Specialists Law, as it pertains to the specialities of dentistry, has just been received. It is understood that this act has been passed by both the Oklahoma legislative bodies and now awaits only the governor's signature in order to become a law.

Excerpts from the Oklahoma Specialists Law follow; inasmuch as, being new, the law will interest the readers of the JOURNAL:

"SECTION 25. No member shall announce and/or hold himself out to the public as limiting his practice to, or as being especially qualified in, any branch of dentistry, without first having obtained a license therefor from the Board as hereinafter provided.

"The Board, upon satisfactory proof that the applicant has had a minimum of thirty semester hours of graduate work in any one of the several recognized branches of dentistry in an approved college or university, or its equivalent, to be determined by the Board, or has complied with any additional requirements of the Board, may issue a license to any member authorizing such member to hold himself out, or to announce, to the public that he is especially qualified in, or limits his practice to, or gives special attention to, any one of the recognized branches of the dental profession. Examinations shall be theoretical and practical. The theoretical examinations shall be in writing and include all the subjects represented in the different branches of approved graduate schools. Written examinations may be supplemented with an oral examination. Demonstrations of the applicant's skill are also required.

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Excerpts from the Oklahoma Specialists Law follow; inasmuch as, being new, the law will interest the readers of the JOURNAL:

"SECTION 25. No member shall announce and/or hold himself out to the public as limiting his practice to, or as being especially qualified in, any branch of dentistry, without first having obtained a license therefor from the Board as hereinafter provided.

"The Board, upon satisfactory proof that the applicant has had a minimum of thirty semester hours of graduate work in any one of the several recognized branches of dentistry in an approved college or university, or its equivalent, to be determined by the Board, or has complied with any additional requirements of the Board, may issue a license to any member authorizing such member to hold himself out, or to announce, to the public that he is especially qualified in, or limits his practice to, or gives special attention to, any one of the recognized branches of the dental profession. Examinations shall be theoretical and practical. The theoretical examinations shall be in writing and include all the subjects represented in the different branches of approved graduate schools. Written examinations may be supplemented with an oral examination. Demonstrations of the applicant's skill are also required.

"A special license shall be required for the practice of each recognized branch of dentistry in order for the member to hold himself out to the public

as limiting his practice to, or being especially qualified in, any branch of dentistry. The fee for such examination, and special license, shall be twenty (20) dollars, and any applicant failing to pass such examination shall be entitled to one additional examination for an additional fee of five (5) dollars.

The Arizona Orthodontic Law

A RECENT important legislative situation concerning the practice of dentistry which has been of considerable interest to the entire profession is the eclipse of the so-called Arizona Orthodontic Law, which automatically occurred when on March 4, 1935, the governor of the state signed a new act relating to dentistry which goes into effect June 4, 1935. In Arizona was created the State Board of Dental Examiners, defining its powers and duties, providing for licenses, etc., and for repealing the Chapter II, Session Laws of 1929. The new law, as adopted in Arizona, of interest to orthodontists states: " 'dentistry,' 'dentist,' and 'dental' shall include and embrace 'orthodontia,' 'orthodontist,' and 'orthodontic' respectively." The Arizona State Dental Society voted to eliminate all reference to orthodontia in the new law and approval of the new draft.

Arizona created a statute only a few years ago providing for a special board of orthodontic examiners, aside and apart from the State Board of Dental Examiners. That is to say, the statute provided that if an orthodontist came in from the outside and desired to practice in the state, he must pass the Board of Orthodontic Examiners instead of the examination given by he Denal Examiners. Those who were responsible for this law pointed out that it was based primarily upon the proposition that the average dental practitioner, being untrained and untutored in the practice of modern orthodontia, should not be permitted to practice upon the citizens of the commonwealth. The primary purpose in all professional statutes is, of course, the protection of the people and their general welfare. The law attracted no small amount of attention, particularly from orthodontists throughout America, because the specialty has from time immemorial been generally regarded, both educationally and legislatively, as a department of dentistry, and for one state to deviate from this precedent and create a special orthodontic board was, to say the least, generally regarded as extraordinary, interesting, and experimental. The American Society of Orthodontists considered the incident of sufficient importance to appoint a special committee to investigate this legislation and to report its recommendations to the Society. Judging by the ultimate destination, it has apparently been regarded by the dental association of the state of Arizona as legislation which, after five years' trial, does not work successfully in actual practice to the best interests of both the dental profession and the layman.

The Arizona law attracted attention because it was new and unique; nevertheless it seemed quite generally to be regarded as fundamentally unsound and was not expected to endure the test of time, for the reason that orthodontia, technically at least, still is and always has been a department of dentistry, as,

for instance, is the extraction of teeth also a division of the practice of dentistry. Therefore, as long as Class A universities give the degree of D.D.S. to men to qualify them to practice dentistry in all its departments, it is futile to hope that a state statute of this character would stand a test. It would surely be regarded technically as cart-before-the-horse legislation.

After all there can be only one real remedy for the so-called inadequate orthodontic training of the dental profession, and this remedy should begin at the source of dental education, which is none other than the dental schools themselves. Schools will no doubt in time solve this rather difficult problem to the satisfaction of the dental profession and for the benefit of the students. There is still need, however, for the elimination of much pedagogical orthodontic "sky-writing and shirt-stuffing" in teaching the undergraduate. Not until the dental student is honestly and sincerely taught what is known about the practical application of orthodontic treatment, just as he is taught the practical application of crown and bridge work and therapeutics, will there be much advance among general practitioners either in treatment or in their interest in malocclusion as a department of dentistry.

The entire gesture of the Arizona law, both its birth and its demise, is evidence of several things. Its birth testifies to the fact that specialists, at least in Arizona, believe that dentists are incompetent to practice orthodontia and should be prohibited from doing so. The sudden demise of the law attests the fact that the Arizona State Dental Society still believes orthodontia to be a department of dentistry and that it should be under the direct control of the State Board of Dental Examiners. The casual observer would probably say that both are right, but that the orthodontic law is not the correct answer to the problem. The answer is in the field of dental education.

H. C. P.

News and Notes

European Orthodontic Society

The European Orthodontic Society will hold its meeting at the Langham Hotel, London, W. 1, on July 29 and 30, 1935, with Dr. Sheldon Friel as its President. Many eminent European orthodontists have signified their intention of being present and reading papers or giving clinics and demonstrations. They look forward to a very interesting meeting, as there is a marked and growing desire to acquire knowledge of this fascinating subject.

The meeting will be immediately followed by the annual meeting of the American Dental Society of Europe, and it is expected the attendance will be a large one. Doubtless, when the final arrangements are made, there will be an exchange of hospitalities between the two societies, which was the arrangement of the last meeting at Scheveningen, The Hague, in May, 1934.

The European Orthodontic Society, by invitation from the Secretary, Mr. G. F. Cale-Matthews, is very eager that co-patriots of America attend this meeting and contribute to the program.

The officers of the European Orthodontic Society at the present time are as follows: President, E. Sheldon Friel, Dublin; Vice President, H. E. March, Bexhill, England; Secretary, G. F. Cale-Matthews, London; Editor and Treasurer, O. Henry, London. Board of Censors: J. T. Quintero, Lyon; F. Stuhl, Paris; E. D. Barrows, London.

American Dental Assistants Association

The eleventh annual meeting of the American Dental Assistants Association will be held in New Orleans, Nov. 4-8. Headquarters will be at the De Soto Hotel. For further information address

LUCILE S. HODGE, General Secretary,
401 Medical Arts Building,
Knoxville, Tenn.

Southern Society of Orthodontists

The fourteenth annual meeting of the Southern Society of Orthodontists will be held at the Signal Mountain Hotel, Chattanooga, Tenn., on September 30, October 1 and 2.

Members of the dental and medical professions are cordially invited.

WINSTON P. CAINE, President,
Medical Arts Building,
Chattanooga, Tenn.

WILLIAM P. WOOD, JR., Secretary,
442 W. Lafayette Street,
Tampa, Florida.

Dental Society of the State of New York

The Society will hold its Sixty-Seventh Annual Meeting June 12-15, 1935, at Saranac Inn, Upper Saranac, N. Y.

A cordial invitation is extended to all ethical dentists to attend the sessions.

Dr. Augustave Neuber, President
619 Union Street,
Schenectady, N. Y.

Dr. A. P. Burkhart, Secretary
57 E. Genesee Street,
Auburn, N. Y.

Fourth Belgian National Dental Congress

The Fourth Belgian National Dental Congress will be held at the George Eastman Dental Institute in Brussels from August 1 to 4.

For information write to Mr. A. Joachim, President of the Congress, 3 Rue de Hornes, Brussels; or to Mr. L. Demoulin, General Secretary of the Congress, 15 Avenue Fonsny, Brussels, Belgium.

International Dental Federation

The 29th session of the F. D. I. will be held August 4 to 10, in Brussels in the George Eastman Dental Institute, immediately following the Fourth Belgian National Dental Congress. This will be the last session before the International Congress in Vienna.

For information write to the General Secretary of the F. D. I., Mr. Ch. F. L. Nord, 1 Scheveningscheweg, The Hague.

International Congress at Vienna in 1936

The Quinquennial International Congress of 1936 will be held August 2 to 8, in Vienna, Austria. It has been planned that communications will be read in the mornings and demonstrations will be given in the afternoons.

George Villain, President
Paris.

Ch. F. L. Nord, Secretary
The Hague.

Present Status of Social Security Bill

In an editorial (*Today*, April 27) entitled, "The A-B-C of Social Security" Raymond Moley gives the present status of the Federal Social Security Plan. He says:

"In general, the plan provides for the joint action of the nation and the states, a few of which, including New York, Washington and Utah, have already acted. It includes two kinds of benefits, old age and unemployment. A few appropriations are made for child welfare and public health, but these are incidental. Health insurance is not included. A violent controversy on this subject is raging in the medical profession, and the government is wisely refraining from action until public sentiment, in one way or another, shall have crystallized. In any event, provision for old-age and unemployment benefits are the major parts of a program and can immediately be put into effect."

It is quite evident, from the above paragraph, that the action of the American Medical Association and the American Dental Association has made Washington realize that providing health security for 130 million heterogeneous people is not so simple a procedure as health insurance advocates would have us think.

More time is needed, more mature thought is needed, more intense study of the entire problem is needed, in order to provide the best possible service to the greatest number of people, with the least interference from outside agencies, and to the greatest advantage of the public and the profession.

The Middlebury Tragedy

Orthodontists all over America have been asked to assist the police of Vermont in identifying three skeletons which were found near Middlebury, Vermont, one an adult, assumed to be the mother, and two children, probably girls. Death may have occurred two years ago or less. All victims bore bullet holes in their skulls. The only clue to identification at present is the orthodontic work in the mouth of the elder child. This work has been minutely described by Dr. Alfred P. Rogers of Boston as follows:

Upper

1 Angle's large ribbon arch #g-400-YA.
6 Angle's bands anterior #G-430-XA.
2 Made-up molar bands with 2 Angle's gold tubes #G-460 soldered on.
2 Intermaxillary anchorage hooks placed opposite the mesial third of the cuspids have balled ends. Angle's lock pins #G-453-A are used on the anterior bands.

Lower

Lingual arch made of round 19 gauge platinum wire, not Angle's.
2 Made-up molar bands with half round tubes soldered on. Spring locks made of 0.028 wire.

The orthodontic work is described as having been done by some one who was an expert in his line and a well-trained orthodontist. This information is being passed to orthodontists with the hope that some one may recognize his work from the description and establish identification of the victims. Any one having information is requested to communicate with Mr. John P. Conley, attorney for the state of Vermont.

Notes of Interest

The San Mateo Dental Guild was opened May 22, 1935. Dr. Earl F. Lussier, practice limited to orthodontia; Dr. Hilary J. Maze, general practice of dentistry; Dr. Norman A. Lussier, consultant oral surgeon. Offices at 36 El Camino Real, San Mateo, Calif.